New Jersey's Wildlife Action Plan

NJ Department of Environmental Protection
Division of Fish and Wildlife

March 2018

New Jersey's Wildlife Action Plan

State of New Jersey
Department of Environmental Protection
Division of Fish and Wildlife
Mail Code 501-03
P.O. Box 420
Trenton, NJ 08625-0420
www.NJFishandWildlife.com

Philip D. Murphy, Governor
Catherine McCabe, Acting Commissioner
Larry Herrighty, Director

Endangered and Nongame Species Advisory Committee

Dr. Rick Lathrop, Chair
Dr. James Applegate
Dr. Barbara Brummer
Dr. Joanna Burger
Dr. Emile DeVito
Howard Geduldig
Dr. Erica Miller
Dr. David Mizrahi
Jane Morton Galetto
Dr. Howard K. Reinert
James A. Shissias

Fish and Game Council

Frank Virgilio, Acting Chair
Phillip Brodhecker
Joe DeMartino
Jim DeStephano
Agust Gudmundsson
Dr. Rick Lathrop
Jeffrey A. Link
Robert T. Pollock
Loren Robinson
Ken Whildin

NEW JERSEY DIVISION OF
Fish and Wildlife

March 2018

DEPARTMENT OF ENVIRONMENTAL PROTECTION
NEW JERSEY

ACKNOWLEDGMENTS

The New Jersey State Wildlife Action Plan (Plan) is a blueprint for the future conservation of our state's species of greatest conservation need. We wish to acknowledge the staff of the Endangered and Nongame Species Program (ENSP) within the NJ Department of the Environmental Protection's (NJDEP) Division of Fish and Wildlife, and the staff of the Conserve Wildlife Foundation of New Jersey whose dedicated work over many months shaped the Plan. ENSP staff include David Jenkins (Chief), Kris Schantz, Kathy Clark, John Heilferty, Jeanette Bowers-Altman, Christina Davis, Amanda Dey, Gretchen Fowles, MacKenzie Hall, Brian Henderson, Kim Korth, Sharon Petzinger, Patrick Woerner, Brian Zarate, Kerri Smith and Emily Melendez. Numerous programs and staff from the NJDEP and the various Bureaus within the Division of Fish and Wildlife provided valuable review and input, especially Shawn Crouse and Greg Hinks from Freshwater Fisheries and Marine Fisheries, respectively. Special thanks to Director Larry Herrighty, former Director David Chanda, and Assistant Director Dave Golden for their continued support and assistance during the development and review of the plan. We also appreciate significant input from Assistant Commissioner Rich Boornazian, as well as Kathleen Walz of the NJDEP's Office of Natural Lands Management.

A special debt of gratitude is owed to the New Jersey Endangered and Nongame Species Advisory Committee, and former and current chairs Barbara Brummer and Rick Lathrop. Their expertise and guidance over the years and during the development of the plan have helped New Jersey become a national leader in rare species conservation. The NJ Fish and Game Council also provided input.

We are also grateful to the Conserve Wildlife Foundation of New Jersey for their support of this project and thank Executive Director David Wheeler, and staff Liz Silvernail, Todd Pover, Ben Wurst, Larissa Smith, and Michael Davenport for assistance in reviewing, editing, and pursuing implementation of the plan. Special thanks to David VanLuven for his editorial work and oversight. Other agencies and New Jersey conservation organizations that were major contributors to the plan that deserve special recognition include the NJ Audubon Society, the NJ Conservation Foundation, The Nature Conservancy-NJ Chapter, the NJ Pinelands Commission, the D&R Greenway Land Trust, the U.S. Fish and Wildlife Service-NJ Field Office, the National Wildlife Refuges (NWR) [namely, Edwin B. Forsythe NWR, Cape May NWR, Supawna Meadows NWR, Great Swamp NWR, and Wallkill River NWR], the National Park Service (Gateway National Recreation Area–Sandy Hook Unit and Delaware Water Gap National Recreation Area–Milford, PA), the U.S. Department of Defense, the USDA Natural Resource Conservation Service, and the NJ State Forestry Service.

The inherent danger in writing an acknowledgment is not mentioning all the individuals and organizations that contributed. This is especially true for the New Jersey State Wildlife Action Plan since so many people and organizations played key roles in its development. We encourage readers to carefully review Appendix L within the plan that we hope includes all who participated in the development of this plan.

This page intentionally left blank

EXECUTIVE SUMMARY

A. Background

In 2000, Congress created the federal State Wildlife Grants program to help states conserve imperiled wildlife species, particularly those that were not traditionally hunted or fished. The program required states to develop Comprehensive Wildlife Conservation Strategies, later known as State Wildlife Action Plans, which identified Species of Greatest Conservation Need (SGCN), their habitats, threats, and conservation actions to protect them. In addition to providing a blueprint for conserving each state's rare and imperiled wildlife, the plans made states eligible for federal State Wildlife Grant funds for conservation action.

The New Jersey Division of Fish & Wildlife (DFW) released the first New Jersey State Wildlife Action Plan in 2006 and a slightly revised version of it in 2008. That plan embodied (and continues to embody) the collective judgment of the state's conservation professionals regarding which species and areas should receive special attention and what should be done. It identified tasks that could be accomplished by a variety of agencies, organizations, and landowners to keep common species common and to down-list or delist rare species.

This 2017 plan is the first complete revision of the initial plan. In essence, this plan is an assessment of the health of the state's wildlife and habitats, the problems they face, and actions that are needed to conserve them over the long term. With federal funding from the State Wildlife Grants program and state and private sources, the plan fosters cooperation between partners in the public and private sectors and enables effective conservation projects.

A fundamental underpinning of this plan is the recognition that certain species require new or additional conservation actions to ensure their long-term persistence. Because of changes in New Jersey's environment – both from past human activities and ongoing threats with local or distant origins – these wildlife species are unlikely to persist in the state without conservation action.

This plan is a dynamic tool for all landowners and land managers. Many components of the plan are useful to private property owners whether they manage a small backyard or a significantly larger property, and whether their property is actively used (such as for farming) or is left in a natural condition. These same plan components can also be applied by the managers who steward the state's many public and nonprofit-owned properties. Regardless of the property or the owner, this plan is designed to serve as a framework for directing the protection of Species of Greatest Conservation Need and the habitats required for their continued survival.

B. Core Underpinnings of the Plan

There are seven key considerations that permeate all aspects of this revised plan.

- ***Habitat Loss Is the Greatest Threat to New Jersey's Wildlife*** – Habitat loss, including *both* a) the complete loss of wildlife habitat, and b) the conversion of "suitable wildlife habitat" to conditions that no longer serve critical suitability needs of wildlife species, is a primary risk to wildlife, both directly and by disrupting essential life history and behavior patterns. Habitat and connectivity maps generated with the Landscape Project

and Connecting Habitat Across New Jersey (CHANJ) project are key tools for integrating wildlife considerations into planning and regulatory processes.

- ***Stewardship and Restoration Are Critical Actions*** – Managing for biodiversity management on public and private lands is necessary to ensure the persistence of New Jersey's biological diversity. Key actions include research, monitoring, refining best management practices, maintaining properties with critical habitats, and restoring riparian buffers.
- ***Wildlife Management Must Control Overabundant Species*** – Control of overabundant species in and around critical habitats is vital for protecting New Jersey's rare wildlife species. Some species, in particular white-tailed deer, when unchecked, can change habitats at a landscape scale and eliminate habitats on which rare wildlife depend. Other wildlife, like raccoons, foxes, and crows, fall in the category of "human-subsidized predators," whose elevated populations can cause high rates of mortality for rare wildlife. Programs like Community-based Deer Management and targeted wildlife management can be effective, especially when implemented in collaboration with private landowners and public land stewards.
- ***Invasive Species Threaten Native Biodiversity*** – Invasive species, both plant and animal, often out-compete and crowd out native species, leaving behind less diverse ecosystems. Priority conservation actions include identifying routes through which invasive species are introduced, improving monitoring within and beyond New Jersey, and implementing management and eradication efforts.
- ***Recovery Plans Are Important for Effective Action*** – Ensuring the persistence of imperiled wildlife species in New Jersey typically requires a complex set of actions to be taken over many years. While this plan lays out threats and conservation actions for many species, more focused and more detailed recovery plans are an important tool, particularly for federally and state-listed species.
- ***Sound Science Must Be a Foundation for the Plan*** – The information and recommendations in this plan are built on rigorous research and expert interpretation of all available data. But more research and monitoring are needed to ensure that conservation actions are effective. For example, this plan calls for adaptive management procedures to use new information to inform and guide research and conservation actions throughout New Jersey.
- ***Urban & Suburban Environments Pose Distinctive Challenges*** – As the nation's most densely populated state, New Jersey's urban and suburban environments present unique challenges. Urban wildlife oases are still being identified, and strategies for maintaining them in the context of surrounding activities are still needed for many locations.

C. Past Successes Have Laid a Strong Foundation for Future Conservation

New Jersey's State Wildlife Action Plan has been guiding conservation strategies to benefit wildlife and their habitats throughout the state since 2006. Important actions from the plan have been implemented by local, county, state, and federal agencies, non-profit organizations, and private landowners. Many examples are provided in the plan, including:

- ***Bringing Bald Eagles Back from the Brink*** – From 2005 to 2014, the number of bald eagles nesting in New Jersey increased from 42 pairs to 150 pairs, a 257% increase. This was accomplished by protecting nesting sites through cooperative relationships with

public and private landowners. Trained volunteer nest observers provide data on most of the nests statewide as well as assist with the DFW's outreach programs.

- ***Restoring Endangered Bog Turtles*** – In partnership with other agencies, the DFW is working to restore federally threatened bog turtle populations using cooperative agreements with landowners to restore and protect valuable wetlands habitats. One innovative program pioneered in New Jersey was the restoration of hundreds of acres of wetland habitat through prescribed grazing.
- ***Restoring Fish Habitats*** – Bureau of Freshwater Fisheries staff provide technical assistance on conservation, stream restoration, dam removal, and land use projects. The Musconetcong and Raritan Rivers both benefited from dam removals, and efforts are underway for additional removals on the Millstone and Paulins Kill Rivers.
- ***Managing Complex Wildlife Habitats*** – Excellent stewardship by New Jersey's conservation partners and individual landowners have benefitted wildlife and their habitats across more than 40,000 acres. Examples include the management of important agricultural grassland, early successional, wetland, and riparian habitats with periodic mowing, prescribed burning, and other techniques to benefit grassland birds and other wildlife. Partners also re-contoured and planted degraded lake and stream shorelines to enhance water quality and wildlife value. Further, forests on private and public lands were managed to increase their species diversity and understory vegetation.

D. Focusing on Species of Greatest Conservation Need

New Jersey is home to more than 3,700 wildlife species, from monarch butterflies to blue whales. Some species are stable or have growing populations. Others are rare, perhaps naturally because they live in unusual habitats, or perhaps due to changing or disappearing habitats.

A challenge for all wildlife managers is determining where and how to direct limited resources to best support the full range of wildlife diversity in New Jersey. This State Wildlife Action Plan is an important step to guiding conservation activities, whether they are implemented by state agencies, nonprofit organizations, or neighborhood groups.

Species of Greatest Conservation Need (SGCN) are the heart of all State Wildlife Action Plans. New Jersey's original 2006 Plan, along with the 2008 Revised Plan, addressed 289 SGCN. In preparation for this plan, the ENSP, with other wildlife experts and conservation partners, reassessed the state's wildlife species and created an updated list of 656 SGCN.

While comprehensive, at 656 species the SGCN list is too big for an effective State Wildlife Action Plan with achievable goals. With input from our conservation partners, the DFW therefore refined the list with taxonomic experts and conservation partners to identify 107 Focal SGCN. These species were selected based on their state and regional imperilment, the importance of New Jersey populations to each species' range-wide viability, and the feasibility of undertaking actions that would yield successful results.

While this revision of the State Wildlife Action Plan is focused on 107 species, it is not being suggested, nor should it be implied, that the state's conservation interests are limited to these species. The NJ State Wildlife Action Plan's Executive Committee, a group composed primarily of conservation partners, simply believed that this more focused approach to planning and

conservation would yield greater conservation results not only for the Focal SGCN, but for the many other SGCN that are not formally addressed within the plan.
Recognizing that synergies exist between species with overlapping habitats, the 107 Focal SGCN were grouped by the expert taxonomic teams into guilds that reflected similarities in the species' taxonomies, ecological requirements, threats, and actions needed to conserve them. This assessment categorized 77 of the species into 18 groupings, while the remaining 30 species remained ungrouped.

Appendix D presents species characterization reports for each Focal SGCN (*Profiles of the Focal Species of Greatest Conservation Need*). These profiles include general information about the species (including its appearance, life history requirements, and distribution in New Jersey), conservation status, population abundance and trends, broad habitat types, and more.

E. Concentrating on Key Habitats and Conservation Focal Areas

Effective conservation of New Jersey's diverse wildlife requires planning at different scales. At the finer scale, Focal SGCN provide a discrete set of wildlife that are both in need of immediate protection *and* perceived to be responsive to known and feasible conservation actions. Implementing targeted efforts towards Focal SGCN will also benefit many other species. That said, species-specific conservation is not enough, especially given the long-term shifts that are occurring now, and will continue to occur as New Jersey's landscape continues to change in response to human activities compounded by changing climate.

To address this broader scale need, the ENSP identified Conservation Focal Areas (CFAs). CFAs are specific areas of New Jersey that feature some of the state's highest value habitats and present important opportunities for effective conservation action. They allow for the consideration of threats and actions from a geographic perspective so will benefit key wildlife habitats generally and, in turn, virtually all SGCN. Further, CFAs include important opportunities for habitat connectivity, a critical factor in increasing resilience in a changing landscape.

CFAs reflect a wide variety of habitats throughout New Jersey based upon factors including quality, integrity, connectedness, and the likelihood of successfully implementing conservation actions within them. With their rich mix of important habitats and diverse species assemblages, CFAs represent some of the best opportunities for protecting, restoring, and sustaining New Jersey's wildlife diversity.

Through the two-pronged approach of Focal SGCN and Conservation Focal Areas, the 2017 Revised Plan is designed to better enable the DFW and conservation partners to focus their efforts and limited resources. The plan will help a variety of users – whether individual property owners or statewide organizations – advance their specific interests through actions and in habitats that will benefit all of New Jersey's wildlife diversity.

F. Recognizing Threats and Taking Actions to Address Them

New Jersey's wildlife and their habitats face hundreds, if not thousands, of threats to their persistence and well-being. Many of these threats, along with the conservation actions necessary to alleviate their impacts, have been identified in this plan with an emphasis on Focal SGCN.

This State Wildlife Action Plan is necessary because many of New Jersey's wildlife species face threats that could make them disappear from the state. At the same time, actions to address these threats could help many species recover to the point that they no longer need to be officially listed, or keep them from declining to the point where they need to be listed.

Using the 107 Focal SGCN as representatives of New Jersey's wildlife, DFW teams of taxa experts assessed threats related specifically to each. This assessment distilled the myriad of conservation actions needed to protect New Jersey's wildlife and their habitats into those actions that are most significant and will have the greatest impact on wildlife conservation in the next ten years.

Appendix J presents the *Threats and Conservation Actions for the Focal Species of Greatest Conservation Need* report that includes extensive and highly detailed lists of threats and the applicable conservation actions for each of the Focal SGCN. Plan users should consider this information when developing new or adapting on-going conservation projects.

Additional assessments delivered a wide-ranging list of actions, some of which were directed at overarching benefits to multiple SGCNs and their habitats, and some that applied only to individual species. The DFW grouped these actions when they addressed a particular threat, a suite of related threats, or a conservation need. These groups of actions – or projects – were then divided into jobs that would collectively help accomplish the project.

Appendix K contains the *Projects to Conserve New Jersey's Wildlife Populations of Concern* report. The report lists 32 projects which include 102 jobs; one project and its associated job are under development. For each job, the report describes the objective and purpose, benefits, Focal SGCN it would directly benefit, threats, and conservation actions.

G. Monitoring Effectiveness and Adapting Management for Greater Success

Monitoring comes in many forms and can serve many different conservation purposes. At the most basic level, monitoring can simply note whether or not a species continues to be present at a given location. At a more detailed level, monitoring can help managers determine the effectiveness of conservation actions and, in turn, adapt management activities to maximize their benefits.

Adaptive management is the process through which conservation actions are undertaken, assessed through careful monitoring, and then modified as necessary based on the monitoring results. Adaptive management is necessary because there is still so much we don't know about wildlife, their habitats, and the complex interactions of these with the surrounding world. In addition to gaining insights into wildlife management from conservation and monitoring efforts in New Jersey, the DFW is also committed to learning from, and contributing to, work on SGCN in other states.

Many of New Jersey's SGCN and habitats have active monitoring programs, some dating back more than 60 years. For example,

- The ENSP's ***Landscape Project*** maps critical wildlife habitat using species sighting data applied to suitable habitat types. Adopted by the NJ Department of the Environmental Protection (NJDEP) in 1993 to define habitats, it is a powerful tool for conservation planning and measuring habitat change over time.
- The ***Breeding Bird Survey*** in New Jersey is part of the national breeding bird survey that is used to detect bird population trends nationally and, to a lesser degree, within the state. Conducted largely by skilled volunteers, the data are considered each time the state reassesses bird species' conservation statuses and trends.
- Since 1968, the DFW's ***Trout Production Stream Monitoring Project*** has identified and classified New Jersey waters according to their suitability for trout. The classifications became part of the state's Surface Water Quality Standards in 1981, and trout-suitable waterways receive greater protection under state regulations.

H. Meeting Federal Requirements Now and in the Future

As with the 2006 Plan, the 2017 State Wildlife Action Plan must meet a suite of federal requirements overseen by the U.S. Fish & Wildlife Service. Specifically, every plan across the country must contain eight key elements:

1. Information on the distribution and abundance of wildlife species;
2. Descriptions of locations and relative condition of key habitats and community types;
3. Descriptions of problems and priority research and survey efforts;
4. Descriptions of conservation actions;
5. Proposed plans for monitoring;
6. Descriptions of procedures for reviewing the plan;
7. Provisions for coordinating the development and implementation of the plan with federal, state, and local agencies and representatives of organized New Jersey Native American groups; and
8. Provisions for broad public participation.

From 2018 to 2021, the DFW will continue revising the 2017 Plan to fill information gaps, provide additional clarity and guidance to plan users, and further prioritize conservation efforts.

TABLE OF CONTENTS

EXECUTIVE SUMMARY i
TABLE OF CONTENTS vii
ROADMAP TO THE EIGHT REQUIRED ELEMENTS ix
GUIDE TO NEW JERSEY'S STATE WILDLIFE ACTION PLAN xiii
INTRODUCTION 1
I. Background 1
II. Purpose of the State Wildlife Action Plan 1
III. NJ's State Wildlife Action Plan Planning Framework 4
IV. 2017 Changes to NJ's State Wildlife Action Plan 5
V. State Wildlife Action Plan Implementation (2006-2016) 7
CHAPTER 1: NEW JERSEY'S MOST VULNERABLE WILDLIFE 23
I. Process for Selecting SGCN and Focal SGCN 23
CHAPTER 2: HABITATS of NEW JERSEY 31
I. Mapping SGCN Habitat 31
II. Identifying Conservation Focal Areas 31
III. New Jersey's Landscape Regions & Conservation Focal Areas (CFAs) 33
Atlantic Coast Landscape Region and Its CFAs 36
Delaware Bay Landscape Region and Its CFAs 41
Piedmont and Inner Coastal Plain Landscape Region and Its CFAs 46
Pinelands Landscape Region and Its CFAs 55
Skylands Landscape Region and Its CFAs 60
Marine Landscape Region and Its CFAs 67
IV. Notes Regarding Habitat Classifications Used or Referenced in this Plan 71
CHAPTER 3: THREATS AND ACTIONS FOR FOCAL WILDLIFE & HABITATS 73
I. Overview of Threats to Wildlife and Their Habitats 73
II. Conservation Actions for Wildlife and Their Habitats 87
III. Threats and Conservation Actions for the Focal Species of Greatest Conservation Need Report 96
IV. Projects to Conserve New Jersey's Wildlife Populations of Concern Report 101
V. Future Work with Conservation Focal Areas 105
VI. Integrating Flora and Natural Communities as Important Components of Biological Diversity 105
CHAPTER 4: MONITORING 107
I. Monitoring Programs & Projects 107
II. Adaptive Management 117
III. Coordinating State & Regional Monitoring 118
CHAPTER 5: STATE WILDLIFE ACTION PLAN REVISION PROCESS 119
I. Future State Wildlife Action Plan Revisions 119
II. Coordination with Other Agencies 119
III. Public Input Process 121
SOURCES 125

APPENDICES

Appendix A: Criteria for Selecting Species of Greatest Conservation Need
Appendix B: New Jersey's Species of Greatest Conservation Need and the Selection Criteria Each Fulfilled
Appendix C: Species of Greatest Conservation Need, their Distribution within New Jersey, and Habitat Associations
Appendix D: Profiles of the Focal Species of Greatest Conservation Need
Appendix E: Delineating Conservation Focal Areas
Appendix F: Habitat crosswalks
Appendix G: Conservation Focal Areas' Habitat Types
Appendix H: List of the Threats and Action Drivers
Appendix I: List of Conservation Actions
Appendix J: Threats to and Conservation Actions for the Focal Species of Greatest Conservation Need
Appendix K: Projects to Conserve New Jersey's Wildlife Populations of Concern
Appendix L: Action Development Workshops' Invitees and Attendance
Appendix M: USFWS TRACS Indicators to Measure Success of Conservation Actions
Appendix N: Glossary

ATTACHMENTS

Attachment I: Northeast Lexicon Report
Attachment II: Landscape Project Report, v. 3.3
Attachment III: Climate Change Summary for Wildlife Action Plan
Attachment IV: Guidelines for Integrating Plants into Actions for Wildlife

ROADMAP TO THE EIGHT REQUIRED ELEMENTS

Federal guidelines require that all State Wildlife Plans address eight important elements. The intent of these elements is to help states ensure that their wildlife conservation efforts are strategic, carefully directed, and effective. In this section, we list each of the eight elements and briefly note how they are addressed within this revised plan.

1. Identify the distribution and abundance of Species of Greatest Conservation Need (SGCN)
The state's original 2006 Plan, along with the 2008 Revised Plan, addressed the conservation needs of the state's wildlife Species of Greatest Conservation Need (SGCN), with 289 SGCN identified. Since then, the ENSP modified the criteria for identifying SGCN and changed the status of some species as a result of this assessment. These changes led to the identification of 656 SGCN for the 2017 Revised Plan.

To better guide implementation, the DFW has focused the 2017 Revised Plan on a subset of the full SGCN list. This suite of Focal SGCN was selected through an assessment process that considered state and regional imperilment, the importance of New Jersey populations to each species' range-wide viability, and the feasibility of undertaking actions that would yield successful results.

It must be clearly stated that while this revision of the NJ State Wildlife Action Plan (Plan) is focused on 107 species, it is *not* being suggested, nor should it be implied, that the state's conservation interests are limited to these species. The Plan's Executive Committee, a group consisting primarily of conservation partners, simply believes that this more focused approach to planning and conservation will yield greater conservation results not only for the Focal SGCN, but for the many other SGCN that are not formally addressed within the plan.

Chapter 1 and its associated appendices and attachment provide a detailed discussion of SGCN, their distribution, and their abundance in New Jersey.

2. Describe the location and condition of key habitats essential to the SGCN
Locations of key habitats for SGCNs are described at multiple scales. Ranges of all Focal SGCNs are included in species profiles, while broad habitat categories identified for each Focal SGCN species allow a finer delineation of where habitats for these species are found in New Jersey. Additionally, for more than half of Focal SGCNs, New Jersey's Landscape Project maps provide an even finer resolution of habitat locations.

Pursuing the same efficiencies used for SGCN, the DFW also revised the 2017 Plan's list of habitats where conservation actions could be targeted. The 2006 Plan and the 2008 Revised Plan both recognized that many habitats throughout the state benefitted wildlife and that conservation actions undertaken anywhere would yield positive effects. While this approach provided useful information for every portion of the state, 10 years of plan implementation by numerous partners has led the DFW to conclude that even greater success could be achieved if conservation actions were focused not only on a smaller number of species, but also on more spatially refined areas of conservation interest.

Therefore, in another change from the 2006 Plan and the 2008 Revised Plan, the DFW undertook a second assessment to identify areas where habitat conservation efforts should be focused. The assessment used a relatively species-independent methodology (described in Chapter 2) that identified habitats with higher ecological integrity, larger sizes and core areas, and fewer negative influences like development and roads. The areas selected also ranked higher for biodiversity for both terrestrial and aquatic species richness. The resulting Conservation Focal Areas (CFAs) will help focus conservation efforts to better protect critical core areas and connecting corridors for Focal SGCN and other wildlife

Chapter 2 and its associated appendices and attachment describe the locations and conditions of key habitats for New Jersey's SGCN.

3. Describe the threats to and research needs for SGCN and their habitats

To categorize, assess, and track threats, the DFW utilized the common threats lexicon for the Northeastern states following the International Union for the Conservation of Nature's (IUCN) threats classification scheme and the "action drivers" lexicon used in U.S. Fish & Wildlife Service's Tracking and Reporting on Actions for Conservation of Species (TRACS) system. Working with conservation partners and wildlife experts, the DFW organized threats into 13 threat and action-driver categories based on these lexicons.

DFW teams of taxa experts assessed how each of the threat and action-driver categories related specifically to the 107 Focal SGCN. They used a qualitative, expert-opinion-based approach that considered six threat characteristics for each Focal SGCN: severity, reversibility, immediacy, spatial extent, certainty, and likelihood of impact in the next 10 years. These conditions were used to assign a summary impact rating for each of the Focal SGCN. These ratings were then used to identify the threats that required immediate or near-term conservation actions.

Chapter 3 and its associated appendices and attachments provide a detailed overview of threats and research needs for SGCN and their habitats.

4. Describe the conservation actions required to conserve the identified species and their habitats

For the 2006 Plan, the DFW and conservation partners identified hundreds of conservation actions needed to address the many threats facing SGCN. For this revision, the DFW determined which of these actions needed to be revised for clarification or specificity, could be removed because they were no longer applicable to current conditions, or could be combined or condensed. The goal in this effort was to make the plan easier to use. The DFW also identified additional actions that could address more recent challenges (such as new wildlife diseases and a growing understanding of climate change). All of these actions were categorized using the TRACS lexicon.

The DFW identified the specific conservation actions that applied to each of the threats and action drivers and for each Focal SGCN. The resulting list of actions, however, will benefit from additional, ongoing prioritization to more precisely identify a more limited set of feasible and effective actions on which the conservation community should focus over the next 5-10 years.

Chapter 3 and its associated appendices provide extensive and highly detailed lists of threats, action drivers, and conservation actions for each of the Focal SGCN.

5. Identify monitoring plans for SGCN, their habitats, and the proposed conservation actions
Monitoring is a vital component of this revised plan, both in the context of tracking the status of SGCN and their habitats, and in the context of guiding adaptive management decisions. To ensure that monitoring results are useful within the state and regionally, the DFW will continue to use the U.S. Fish & Wildlife Service's Tracking and Reporting on Actions for Conservation of Species (TRACS) system. This collaborative approach will allow managers to better target their SGCN management actions to achieve the greatest conservation benefits, both in New Jersey and throughout each species' range.

Chapter 4 and its associated appendices provide an overview of past, ongoing, and planned monitoring efforts for each of the Focal SGCN.

6. Describe the review process of the Plan at intervals not to exceed ten years
New Jersey's State Wildlife Plan is a dynamic, evolving document. This plan is the second revision since the plan was first completed in 2006, and additional revisions are planned in 2018 and beyond.

7. Coordinate the Plan with other federal, state, and local agencies' wildlife and land management plans
In 2013, the ENSP created a Plan's Executive Committee to help steer development of the plan. The committee was composed of a strong mix of wildlife experts from government agencies and nonprofit organizations: the U.S. Fish and Wildlife Service-NJ Field Office, the U.S. Department of Agriculture-Natural Resources Conservation Service, the Conserve Wildlife Foundation of New Jersey, the New Jersey Audubon Society, The Nature Conservancy, Ducks Unlimited, the National Wild Turkey Federation, Trout Unlimited, and staff from all bureaus of NJ Division of Fish and Wildlife.

Additional stakeholder input involved regular meetings with the Endangered and Nongame Species Advisory Committees and the Fish and Game Council. Appointed by the NJDEP's Commissioner and New Jersey governor, respectively, these committees are composed of experts from academia, nonprofit conservation organizations, and sportsmen and sportswomen. Members provided the ENSP with guidance on all aspects of the plan's development.

The ENSP also held three Action Development workshops in 2015 that focused on developing actions that were consistent with the TRACS lexicon. Participants in these workshops included municipal, county, state, and federal government agencies in addition to energy companies, academic researchers, and nonprofit organizations.

Three American Indian tribal groups are represented on the New Jersey Department of State's Commission on American Indian Affairs Despite multiple requests for meetings by the DFW, no replies were ever received.

Coordination with these varied stakeholders allows the DFW to consider content from existing New Jersey-specific wildlife management and/or habitat management plans, many of which are referenced in the Species Profiles, into the development of this plan.

8. Include a public involvement process in the development and implementation of the Plan
In 2015, the DFW deployed website pages that detailed plan development and progress, and included a drop-down menu for members of the public to easily use for submitting comments on each plan section and issue. The pages were prominently featured and labeled on both the DFW home page and the NJ Department of the Environmental Protection's main page. Further, whenever the web pages were updated, email notifications were sent to all members of the public who subscribed to the DFW listserv. Through the revision process, 67 public comments were submitted through the website.

In addition to the website, meetings of the Endangered and Nongame Species Advisory Committees and the Fish and Game Council were subject to the state Open Public Meetings Act so had their dates, times, and agenda items broadcast through public notices online, in listservs, and in newspapers.

The final version of the Plan was made available via the DFW's web site for a 40-day public comment period. The public comment period was announced via a Department press release, announcement on the DFW's State Wildlife Action Plan web page, via e-mail distributions to a variety of DFW email listservers (estimated to have reached over 2,400 persons), and posting on the DFW's Facebook page. Public announcements appeared in 7 newspapers of regional or local distribution. The DFW received over 150 comments from members of the public and/or members or representatives of 14 different groups, organizations or agencies.

After considering all comments received, the DFW found that many helped to improve the Plan by identifying text that was either incorrect, unclear, or required additional information. Some of the comments recommended revisions to, or additions or deletions of threats, actions or "Projects," or identified resources or perspectives that enhanced the DFW's understanding or assessment of pertinent issues. These comments all resulted in valuable contributions to the final Plan.

GUIDE TO NEW JERSEY'S STATE WILDLIFE ACTION PLAN

This revised State Wildlife Action Plan (Plan) is, due to the complexity of wildlife management and the wide range of species requiring conservation action, a long and complex document. This section provides a concise overview of the plan and its different sections to help readers navigate the plan and find the information they need.

A. Introduction

The introductory sections provide background information on the plan in the context of the original 2006 Plan and the 2008 Revised Plan. It also includes notes on seven key conservation issues and brief descriptions of the myriad conservation actions taken to conserve Species of Greatest Conservation Need (SGCN) between 2006 and 2016.

B. Chapter 1: New Jersey's Most Vulnerable Wildlife

This chapter walks through the process used to identify New Jersey's 656 SGCN and how additional selection criteria were employed to further refine that list to 107 Focal SGCN. The Focal SGCN are the centerpiece of this plan. Chapter 1 references the following appendices and attachment that provide additional detail related to these wildlife species.

- Appendix A: *Criteria for Selecting SGCN*
- Appendix B: *New Jersey's Species of Greatest Conservation Need and the Selection Criteria Each Fulfilled*
- Appendix C: *Species of Greatest Conservation Need, their Distribution within New Jersey, and Habitat Associations*
- Attachment I: *Northeast Lexicon Report* which provides the lexicon for categorizing and describing threats and actions used my most northeast states and adapted for use in this plan
- Appendix D: *Profiles of the Focal Species of Greatest Conservation Need*, which provides basic information on the Focal SGCN

C. Chapter 2: Habitats of New Jersey

This chapter provides an overview of key areas important for the conservation of New Jersey's SGCN. Central to this chapter are descriptions of 49 Conservation Focal Areas (CFAs) which are located across the state's 6 landscape regions. For each landscape region, the chapter includes concise notes on its location, key habitats, and threats to these habitats and the SGCN using them. For each CFA, the chapter provides notes on its location, important habitat features, and the condition of habitats within it. Chapter 2 references the following appendices and attachment that provide additional detail related to habitats and CFAs.

- Attachment II: *Landscape Project Report, v. 3.3* which provides a detailed description of New Jersey's Landscape Project habitat mapping methodology to identify habitats supporting rare wildlife
- Appendix E: *Delineating Conservation Focal Areas*, which describes the CFA development and mapping process

Appendix F: *Habitat Crosswalks* that compare the various habitat classification systems used or referenced in this plan

Appendix G: *Conservation Focal Areas' Habitat Types,* which describes the general habitats found within each CFA

D. Chapter 3: Threats & Actions for Focal Wildlife & Habitats

This chapter is an overview of the diverse threats to New Jersey's wildlife and their habitats, including discussions of major threats such as pollution and climate change. Further, the chapter discusses conservation actions that are necessary to address these threats. Chapter 3 references the following appendices and attachments that provide additional detail related to threats and actions.

Appendix H: *List of Threats and Action Drivers*, including more detailed New Jersey-specific threats

Appendix I: *List of the Conservation Actions*, including more detailed New Jersey-specific actions

Appendix J: *Threats and Conservation Actions for Focal Species of Greatest Conservation Need*, which is a detailed report on threats and actions

Appendix K: *Projects to Conserve New Jersey's Wildlife Populations of Concern*, which is a selection of ready-to-implement projects that also serve as examples of how plan components can be assimilated to benefit Focal SGCN

Attachment III: *Climate Change Summary for Wildlife Action Plan*, which provides a detailed discussion of ongoing and expected climate change effects on SGCN and management considerations

Attachment IV: *Guidance for Integrating Plant Species of Conservation Concern into Wildlife Action Planning and Implementation,* which includes a report on four sites where integrated management was undertaken and tables summarizing the distribution of rare plant and natural communities in the state

E. Chapter 4: Monitoring

This chapter discusses the importance of monitoring not only to track the status of SGCN and key habitats, but also to assess the effectiveness of conservation actions and support adaptive management. It includes an extensive list of the different species and guild-level monitoring programs that have been underway in New Jersey – some started recently, others dating back more than 60 years. Further, the chapter includes model frameworks for monitoring and measuring the effectiveness of conservation actions for bog turtles and scrub-shrub and young forest habitats. Chapter 4 references the following appendix that provides additional detail related to monitoring.

Appendix M: The *USFWS TRACS Indicators for Measuring the Success of Conservation Actions*, which summarizes the metrics used to monitor the success of implemented actions

F. Chapter 5: State Wildlife Action Plan Revision Process

This chapter describes major efforts that the DFW will be undertaking in the coming years to further develop this revised State Wildlife Action Plan. It also discusses efforts that the DFW

has taken, and will continue to take, to coordinate conservation activities with various partners, and to fully involve interested members of the public in the decision-making process.

Appendix L: *Action Development Workshops' Invitees and Attendance*, which provides a summary of participants who helped develop the 2017 Revised Plan

G. Other Appendices

In addition to the appendices noted above, the plan includes a glossary and citations for references noted in the plan.

Appendix N: *Glossary*, which provides concise definitions of technical terms used in the plan

H. Other Plans

As noted above, the 2017 Wildlife Action Plan is an overarching strategy that identifies Species of Greatest Conservation Need (SGCN), their habitats, threats, and conservation actions to protect them. The Plan assists the Division of Fish and Wildlife in identifying and coordinating conservation efforts with other Divisions in the Department of Environmental Protection, as well as with other state and federal agencies, conservation organizations or non-profits, private landowners, and other states in the region. It is not, however, the *only* plan that provides guidance with respect to wildlife conservation or habitat management efforts in New Jersey. A wide array of other planning tools exist and should be consulted when contemplating conservation work in New Jersey. Many of these plans are identified on the "species profile" pages (Appendix D) for individual focal species addressed in this Plan, but even this listing is not exhaustive. Resources such as the New Jersey Forest Service's "New Jersey Forest Action Plan" and the "Atlantic Flyway Shorebird Business Strategy" authored by the Manomet Center for Conservation Sciences and the US Fish and Wildlife Service, can facilitate advancing the actions identified in New Jersey's Wildlife Action Plan based on species, habitat or management specific expertise.

This page intentionally left blank

INTRODUCTION

I. Background

In 2000, Congress created the federal State Wildlife Grants program to help states conserve imperiled wildlife species, particularly those that were not traditionally hunted or fished. The program required states to develop State Wildlife Action Plans that identified Species of Greatest Conservation Need, their habitats, threats, and conservation actions to protect them. In addition to providing a blueprint for conserving each state's rare and imperiled wildlife, the plans made states eligible for federal State Wildlife Grant funds for conservation action.

The New Jersey Division of Fish & Wildlife (DFW) released the first State Wildlife Action Plan in 2006. This plan was developed in close collaboration with wildlife experts, conservation organizations, and the general public.

Continued work on the plan resulted in the release of a slightly revised plan in 2008. That plan embodied (and continues to embody) the collective judgment of the state's conservation professionals regarding which species and areas should receive special attention and what should be done. It identified tasks that could be accomplished by a variety of agencies, organizations, and landowners to keep common species common, and to down-list or delist rare species.

This 2017 plan is the first complete revision of the initial plan. As with the previous plan, the 2017 State Wildlife Action Plan must contain eight key elements:

1. Information on the distribution and abundance of wildlife species;
2. Descriptions of locations and relative condition of key habitats and community types;
3. Descriptions of problems and priority research and survey efforts;
4. Descriptions of conservation actions;
5. Proposed plans for monitoring;
6. Descriptions of procedures to review the strategy;
7. Provisions for coordinating the development and implementation of the plan with federal, state, and local agencies and representatives of organized New Jersey Native American groups; and
8. Provisions for broad public participation.

In essence, New Jersey's State Wildlife Action Plan (Plan) is an assessment of the health of the state's wildlife and habitats, the problems they face, and actions that are needed to conserve them over the long term. With federal funding from the State Wildlife Grants program and state and private sources, the plan fosters cooperation between partners in the public and private sectors and enables effective conservation projects.

II. Purpose of the State Wildlife Action Plan

This plan is a dynamic tool for all landowners and land managers. Many components of the plan are useful to private property owners whether they manage a small backyard or a significantly larger property, and whether their property is actively used (such as for farming) or is left in a

natural condition. These same plan components can also be applied by the managers who steward the state's many public properties (and there are additional components specific to these lands). Regardless of the property or the owner, this plan is designed to serve as a framework for directing the protection of Species of Greatest Conservation Need (SGCN) and the habitats required for their continued survival.

A fundamental underpinning of this plan is the recognition that certain species require new or additional protection and management to ensure their long-term persistence. Because of changes in New Jersey's environment – both from past human activities and ongoing threats with local or distant origins – these wildlife species are unlikely to persist in the state without conservation action.

Further, there are seven key considerations that permeate all aspects of this revised plan.

A. Habitat Loss or Modification is the Greatest Threat to New Jersey's Wildlife
Habitat loss is a primary risk to wildlife in New Jersey, both directly and by disrupting essential life history and behavior patterns. Habitat maps generated with New Jersey's Landscape Project are a key tool for integrating wildlife considerations into planning and regulatory processes and thereby decreasing habitat loss. The maps are particularly effective when used to inform and guide land use and development decisions that could affect state-listed species. Similarly, the Connecting Habitat Across New Jersey (CHANJ) initiative is helping address habitat fragmentation and connectivity issues. It is also important to note that without proper stewardship, management, or restoration, habitat loss can also result from the gradual modification of conditions that are suitable for, and perhaps serving critical needs of SGCN species, to conditions no longer providing those important characteristics.

B. Stewardship and Restoration Are Critical Actions
Generally, managing for biodiversity on public and private lands is necessary to ensure the persistence of New Jersey's biological diversity. In addition, it is often necessary to implement species- or taxa-specific stewardship or restoration practices to address regional or species-specific needs. Best management practices focused on imperiled species and the ecological integrity of natural communities have only recently become the standard operating procedure on all public lands. This plan recommends continuing this standard regardless of the agency steward. Moreover, coordination and outreach opportunities should also be fostered in partnerships with private and nonprofit landowners. Key actions include research, monitoring, refining best management practices, maintaining properties with critical habitats, and restoring riparian buffers.

C. Wildlife Management Must Address Overabundant or Subsidized Species
Control of overabundant species in and around critical habitats is vital for protecting New Jersey's rare wildlife species. Species like white-tailed deer, when unchecked, can change habitats at a landscape scale and eliminate habitats on which rare wildlife depend. The deer population in parts of the state is so high that it is negatively affecting vegetation and, in turn, other wildlife habitats and populations. Programs like Community-based Deer Management Permits (which can be implemented in areas where traditional hunting is no longer feasible) and Hunters Helping the Hungry (which allows hunters to donate venison to food kitchens) can be

effective, especially when implemented in collaboration with private landowners and public land stewards. Human-subsidized predators, for example, raccoons, foxes, skunks, crows, and feral and free-roaming cats, are adaptable to human landscapes. Where they occur in unnaturally high densities, they can cause high mortality rates for rare wildlife in localized areas. Targeted management of overabundant species can alleviate the pressure they have on rare wildlife.

D. Invasive Species Threaten Native Biodiversity

Invasive species, both plant and animal, often out-compete and crowd out native species, leaving behind less diverse ecosystems. This plan calls for concerted efforts to increase awareness of the risks posed by invasive species, identify new invasive species soon after their arrival, control established invasive species, and eliminate invasive species from key areas. Priority conservation actions include identifying routes through which invasive species are introduced, improving monitoring within and beyond New Jersey, and implementing management and eradication efforts.

E. Recovery Plans Are Important for Effective Action

Ensuring the persistence of imperiled wildlife species in New Jersey typically requires a complex set of actions to be taken over many years. While this plan lays out threats and conservation actions for many species, more focused and more detailed recovery plans are often needed for federal and state-listed species. The Endangered & Nongame Species Program (ENSP) has played, and will continue to play, a central role in the development of these plans.

F. Sound Science Must Be a Foundation for the Plan

The information and recommendations in this plan are built on rigorous research and expert interpretation of all available data. But more research and monitoring are needed to ensure that conservation actions are effective. Additional habitat mapping, species surveys, and scientific modeling are needed to identify the most critical habitats and the wildlife in greatest need of conservation attention. Regular monitoring to measure progress and refine approaches is also necessary for success.

G. Urban & Suburban Environments Pose Distinctive Challenges

As the nation's most densely populated state, New Jersey's urban and suburban environments present unique challenges. For example, bald eagles and peregrine falcons today nest in urban and suburban settings. Some individuals of these species have adapted to habitats with intensive human activity, but they are not completely unaffected by it. Further, some imperiled wildlife use urban environments on a seasonal basis, such as when migrating through the region. These urban wildlife oases are still being identified, and strategies for maintaining them in the context of surrounding activities is still needed for many locations. Urban and suburban environments also tend to have higher levels of toxins, some of which have accumulated over time, others which may be unintentionally released in large volumes (such as oil spills) with catastrophic implications for wildlife. Many of the threats and actions identified in the Plan address the concerns of urban and suburban wildlife. Plan users should note, however, that the Plan's identification of Conservation Focal Areas was *not* designed to capture urban or suburban habitats. Other resources are available (e.g., New Jersey's Landscape Project mapping), or could be developed, to serve this unique need.

III. NJ's State Wildlife Action Plan Planning Framework

The overarching goal of the New Jersey Wildlife Action Plan is to develop a set of implementable conservation actions and projects (sets of inter-related actions) that provide the best opportunity for producing significant conservation of the state's most vulnerable wildlife and thereby meaningfully contribute to the conservation of state, regional, and global wildlife diversity. The planning approach for achieving this goal is straightforward and follows a common conservation planning framework of: 1) identifying conservation targets (species of greatest conservation needs, focal species and their habitats, and conservation focal areas); 2) understanding the factors that are affecting the health and sustainability of the conservation targets (threats); 3) developing wide-ranging conservation actions and sets of inter-related actions that are designed to address the identified threats (actions and projects); 4) including performance monitoring aimed at assessing the progress towards conservation goals, improving the understanding of ongoing and emerging threats; and 5) improving the efficacy of actions by adapting management strategies to this changing information (monitoring / adaptive management).

The assumptions and processes we used to develop conservation targets (species and habitats) are described in greater detail in Chapters 1 and 2, but some key points bear emphasis here. Our approach identifies the state's species that are most in need of conservation and then further refines this list by considering New Jersey's role in regional- and continental-scale conservation. By further focusing on those species for which there is sufficient understanding of conservation needs to develop feasible and consequential conservation actions, we arrived at our focal species conservation targets. Habitat conservation targets include the habitats for focal species, and separately, conservation focal areas comprised of specific geographic areas and representative biological communities where conservation action stands to benefit a wide diversity of wildlife, including significant populations of all wildlife of greatest conservation need.

In this framework, the adverse impacts of human activities comprise threats, while human activities that benefit focal species and habitats are captured in actions. In identifying threats and developing actions, our approach attempts to be forward-looking and anticipatory, that is, the Plan is intended to not only address current threats but to also anticipate threats that may emerge or worsen over the next decade.

We acknowledge that conservation actions on behalf of at-risk species and habitats that are poorly understood must often rely on inadequate or incomplete understanding of threats (severity, risk, likelihood) and actions (feasibility, expected effectiveness, etc.). In this context of uncertainty, a precautionary approach to the conservation of wildlife diversity attempts to minimize risks to conservation targets (species and habitats) by avoiding serious or irreversible environmental harm in advance of scientific certainty of such harm. Implementing this precaution involves balancing the interests of biodiversity/resource conservation, and other countervailing pressures such as economic or livelihood interests. As we perform, with input from stakeholders and conservation partners, the further prioritization of actions that we have recognized as needed (see Chapter 5-I.), striking that balance will be an important goal. Prioritization and implementation of the Plan's actions must and will consider the relative benefits of specific actions and projects in a context that also considers costs (in the broadest

sense) and societal values, and attempt to achieve proportionality between level of risk that particular threats pose to conservation targets and the conservation actions proposed and performed.

Finally, the Plan is intended to be a "living plan" that adopts an adaptive management strategy wherein monitoring is designed to inform progress towards achieving conservation goals, and to inform a continuously improved understanding of threats and diminishing uncertainty, providing feedback necessary to amend and adjust actions and projects.

IV. 2017 Changes to NJ's State Wildlife Action Plan

New Jersey's first version of the State Wildlife Action Plan in 2006, as well as its 2008 revision, were developed by NJ Division of Fish and Wildlife (DFW) staff with assistance and input from the public, the state's many conservation groups, and other stakeholders. As the DFW and its conservation partners (e.g., government agencies, academic institutions, nonprofit organizations, and private landowners) implemented the plan, it became clear that the plan was a powerful resource, but the unwieldy size and format made it difficult for partners to identify the actions they were best suited to undertake.

To address this difficulty, the DFW provided one-on-one guidance to many partners to help them identify, develop, and revise projects. In 2010, with the help of the Conserve Wildlife Foundation of New Jersey, the ENSP held ten meetings for conservation partners across the state to deliver additional guidance on how to navigate the plan, implement it in the context of their objectives, and identify potential funding sources. These efforts helped partners successfully implement many aspects of the plan, but also highlighted the need for the 2017 revision to be streamlined into a more user-friendly resource.

This revision of the State Wildlife Action Plan has been restructured to better focus conservation efforts throughout the state. Among the more apparent changes are:

a. *Focal Species of Greatest Conservation Need*, which are the highest priority wildlife species;
b. *Conservation Focal Areas*, which are specific areas identified for conservation action; and
c. *New lexicons*, which use standardized language to assess threats and conservation actions within and beyond New Jersey's borders.

A. Focal Species of Greatest Conservation Need

The state's original 2006 Plan, along with the 2008 revised Plan, addressed the conservation needs of the state's wildlife Species of Greatest Conservation Need (SGCN), with 289 SGCN identified. Since then, the ENSP modified the criteria for identifying SGCN (described in Appendix A) and changed the status of some species as a result of this assessment. These changes led to the identification of 656 SGCN for the 2017 revised Plan (see Appendices B and C for the complete list, their distribution within the state, habitats where they are found, and the SGCN criteria they fulfilled).

The large increase in the number of SGCN for New Jersey was the result of several factors that together resulted in a considerably more inclusive approach to selecting SGCN than the methods used in 2005.

- The DFW *consulted newly published documents* that provided species conservation information for a broader array of taxonomic groups, such as the Xerces Society's Red List for species like bees, butterflies, moths, and aquatic invertebrates that are known to occur in New Jersey. This resulted in the inclusion of entire taxonomic groups, most notably bumblebees, which were not previously considered for inclusion in the 2006 Plan.
- The DFW *broadened the eligibility criteria* to be more inclusive than in 2005. This resulted in the addition of more species from "red" lists and regional and national taxa plans, including: (a) the IUCN Red List of Threatened Species; (b) Partners in Flight's National Landbird Conservation Plan; and (c) Northeast Partners in Amphibian and Reptile Conservation's Northeast Amphibian and Reptile Species of Regional Responsibility and Conservation Concern.
- The DFW *completed its own assessment* of species statuses in New Jersey using an adaptation of the Delphi Technique for taxonomic groups that had not been subject to review for the 2006 Plan (e.g., marine fish, fairy shrimp, crayfish). The results of these reviews expanded the number of species that met eligibility criteria for SGCN.
- Finally, the DFW added *species that were considered data deficient* (and that were not included in the 2006 Plan) to encourage research of these species.

On the contrary, 42 species were removed from the initial SGCN list as a result of changes to their statuses and the exclusion of game species that did not meet the revised SGCN criteria.

While the DFW remains committed to the conservation needs of all SGCN species, to better guide implementation of the 2017 Revised Plan the DFW has focused on a subset of the full SGCN list. This suite of Focal SGCN was selected through an assessment process that considered state and regional imperilment, the importance of New Jersey populations to each species' range-wide viability, and the feasibility of undertaking actions that would yield successful results. The process of filtering the full SGCN list to Focal SGCN is described more fully in Chapter 1 and Appendix B. The Plan's Executive Committee, a group consisting primarily of conservation partners, believes that this more focused approach to planning and conservation will yield greater conservation results not only for the Focal SGCN, but for the many other SGCN that are not formally addressed within the plan.

B. Conservation Focal Areas

Pursuing the same focus and efficiencies used for SGCN, the DFW also delineated habitats where conservation actions could most effectively be targeted and upon which threats and actions to wildlife habitats, generally, could be assessed. The 2006 Plan and the 2008 Revised Plan both recognized that many habitats throughout the state benefitted wildlife and that conservation actions undertaken anywhere would yield positive effects. While this approach provided useful information for every portion of the state, 10 years of plan implementation by numerous partners has led the DFW to conclude that even greater success could be achieved if conservation actions were focused on a more select group of areas of conservation interest where actions are likely to be more readily implemented and successful.

The assessment used a relatively species-independent methodology (described in Chapter 2) that identified habitats with higher ecological integrity, larger sizes and core areas, and fewer negative influences like development and roads. The areas selected also ranked higher for biodiversity for both terrestrial and aquatic species richness.

Through this two-pronged approach of Focal SGCN and Conservation Focal Areas, the 2017 Revised Plan is designed to better enable the DFW and conservation partners to focus their efforts and limited resources. The plan will help a variety of users – whether individual property owners or statewide organizations – to advance their specific interests through actions and in habitats that will benefit all of New Jersey's wildlife.

C. A New Lexicon for Conservation

A third meaningful change in the 2017 Revised Plan was the language used to characterize threats and conservation actions. As recommended by the Northeast Association of Fish & Wildlife Agencies, New Jersey's revised plan follows the Northeast Lexicon System (Attachment I). Key elements of the system include:

- threats and action drivers are classified using the International Union for Conservation of Nature system; and
- conservation actions are classified using the U.S. Fish & Wildlife Service's TRACS (Tracking & Reporting Actions for the Conservation of Species) system.

These new lexicons (which are described in more detail in Chapter 3) were instrumental for standardized analyses of threats, and corresponding conservation actions, for the Focal SGCN. They also facilitated assessments of threats and conservation actions that crossed state and national borders.

V. State Wildlife Action Plan Implementation (2006-2016)

New Jersey's Plan has been guiding conservation strategies to benefit wildlife and their habitats throughout the state since 2006. Important actions from the plan have been implemented by local, county, state, and federal agencies, non-profit organizations, and private landowners. Below is a brief summary of some of the conservation efforts that have been accomplished.

A. Actions Led by the New Jersey Division of Fish and Wildlife

New Jersey's Landscape Project: Mapping Critical Habitats

Over the past decade, the NJ Division of Fish and Wildlife's Landscape Project has advanced in its Geographic Information Systems (GIS) approach and the scope of its applications. In 2008, the DFW released Versions 2.1 and 3.0 which reflected a transition in the mapping method. Version 2.1 retained a basic mapping approach that combined unique land-use/land-cover (LULC) classes into five general habitat types: forest, forested wetland, emergent wetland, grassland, and beach. Version 3.0 shifted away from these broad habitat categories by adopting a species-based habitat patch approach that associated each species with a unique set of LULC classes according to specific habitat needs. It was developed specifically for the Highlands Region for incorporation into the Highlands Regional Master Plan.

In 2012, Version 3.1 applied this species-based method to the entire state. For the first time, a more precise method of delineating habitat based on species-specific associations was available throughout New Jersey. Version 3.1 also incorporated riparian corridor mapping that identified streams and riparian habitats that are essential to aquatic, semi-aquatic, and floodplain wildlife and that often serve as travel corridors for many species. In addition, the new maps included species not represented in previous statewide versions of the Landscape Project, including freshwater mussels, marine mammals, and marine turtles.

The Landscape Project is being used to help guide strategic wildlife habitat conservation in an ever-expanding variety of ways. At the state level, for example, landscape data have been incorporated into many initiatives including:

- the Highlands Regional Master Plan, which aims to protect natural and cultural resources;
- the Water Quality Management Planning program, as a major component in delineating Environmentally Sensitive Areas that shape where potential sewer service areas can occur and thus influence future development patterns;
- the NJ Department of the Environmental Protection's Green Acres program, to evaluate and prioritize properties under consideration for conservation acquisition; and
- implementation of regulations that contain provisions for protecting habitats that are critical to endangered and threatened wildlife [Coastal Permit Program (N.J.A.C. 7:7), Coastal Zone Management (N.J.A.C. 7:7E), Freshwater Wetlands Protection Act (N.J.A.C. 7:7A), Flood Hazard Area Control Act (N.J.A.C.7:13), Highlands Water Protection & Planning Act (N.J.A.C. 7:38), and Water Quality Management Planning (N.J.A.C. 7:15)].

Landscape maps and overlays also provide a foundation for proactive land use planning, such as the development of local habitat protection ordinances, zoning to protect critical wildlife areas, management guidelines for imperiled-species conservation on public and private lands, and land conservation projects.

The most advanced version (Version 3.3, which is described in Attachment II), released in May 2017, reflects the updated status of many wildlife species, thousands of new species occurrence records, and the most recent LULC data from 2012. In addition to providing access to species lists for areas of interest defined by users, Version 3.3 provides detailed information about occurrences, including their type (e.g., colony, den, nest, foraging, etc.), and the last recorded observation year. Perhaps most importantly, Version 3.3 features easily accessible documentation including transparent descriptions of the methods used and references to supporting scientific literature. More information is available online at http://www.state.nj.us/dep/fgw/ensp/landscape/lp_report_3_3.pdf.

Biotics Database Management

The NJ Department of the Environmental Protection's Biotics database now houses 27,170 records of endangered, threatened, and special concern wildlife. The ENSP applied those species records to the latest version of the Landscape Project habitat mapping. Biotics records of rare wildlife – with information on both abundance and distribution – were also considered by experts in the course of species status reviews. The ENSP review of species status is an important part of keeping the lists of endangered, threatened, and special concern wildlife current, and a

significant revision was adopted in early 2012. A major upgrade to a cloud-based version of the Biotics database, which took place in 2014, improved access, stability, and efficiency.

Technical Guidance for Department Regulatory Reviews and Conservation Planning
ENSP staff provided guidance for the conservation of rare wildlife habitat to agencies within the NJDEP and to many additional parties outside our agency. State Wildlife Grants funding was allocated to technical guidance, policy, and planning in 2008, and since then ENSP biologists have reviewed as many as 650 projects each year.

Initially triggered by a screening of the Landscape Project, many projects are reviewed at the request of the NJDEP's Division of Land Use Regulation. These reviews have included several large-scale linear roadway and utility line projects such as: major widening of the NJ Turnpike and Garden State Parkway; three separate gas pipeline expansions by the Tennessee Gas Pipeline Corp.; new pipeline proposals by the Penn East Pipeline Company and Pilgrim Pipeline Holdings; and a major overhead transmission line upgrade by PSE&G. In addition to performing detailed environmental reviews of the initial applications, these projects often required: (a) additional and ongoing monitoring during construction; (b) violation assessment and enforcement; and (c) assessments of post-construction condition compliance.

Additional technical assistance is regularly rendered to land managers inside and outside the agency. No less important are ENSP consultations with policy makers regarding issues such as mitigation requirements for habitat impacts, provisions for habitat considerations in regulations, species statuses, and standardized policies in land use.

ENSP staff further partnered with the NJDEP's Natural and Historic Resources section to create the "Natural Resources Land Management Policy," an internal review procedure that assesses state and public/private proposals for the use of state-owned lands (including certain recreational uses) for potential adverse effects on rare wildlife or their habitats as depicted in the Landscape Project. The new procedure has resulted in significantly improved inter-agency coordination regarding resource management projects, greatly minimizing the possibility of inadvertent habitat conflicts. It has also enabled the consistent, coordinated internal review of proposals by non-state entities on public lands, such as for "enduro" motorsport events.

Bald Eagles – Back from the Brink
From 2005 to 2014, the number of bald eagles nesting in New Jersey increased from 42 pairs to 150 pairs, a 257% increase. This was accomplished by protecting nesting sites through cooperative relationships with public and private landowners. Volunteer nest observers were recruited and trained, and they provide data on most of the nests statewide as well as assist with the DFW's outreach programs. The number of volunteers actively involved has grown from 54 to 85 since 2005. Nest sites have been mapped and included in the Landscape Project so they can be considered in land use decisions and land acquisition priorities.

Steady Recovery of Peregrine Falcons
ENSP biologists have increased the resident peregrine falcon population from 16 to 28 pairs by providing suitable nest structures and working with managers to accommodate these increasingly urban birds. In 2014, the ENSP began a partnership with Southern Illinois University's Zoology

Department to analyze contaminants in archived, inviable peregrine falcon eggs. Of particular interest is accumulation by peregrines of flame retardant chemicals, as well as monitoring the accumulation of organochlorines and other environmental contaminants.

Least Terns –When Holding the Line Equals Success

New Jersey has some of most visited and heavily used beaches on the Atlantic seaboard. They also now rank among the most highly managed, with the vast majority of New Jersey's coast under beach replenishment or other stabilization efforts including sea walls, groins, and sheet piling. Despite the extent of these engineering efforts, New Jersey's seashore is home to birds that depend on barrier beaches to nest, such as the least tern. Through a combination of nesting area protection, cooperative agreements with municipalities, predation management, and public outreach over the last 10 years, we have kept the least tern population stable at approximately 1,600 individuals (average) with nesting occurring at approximately 15-25 sites. Similar efforts in neighboring Northeast and Mid-Atlantic states have almost certainly kept least terns from needing the protection of the federal Endangered Species Act (unlike least terns in other areas of the county, e.g., California interior populations where they are listed as federally endangered).

Secretive Marsh Birds

Secretive marsh birds (such as rails and bitterns) are among the most under studied birds in New Jersey, owing in large part to the inaccessibility of their habitat and their enigmatic nature, which makes them difficult to detect. However, changing marsh ecosystems (especially from human development, stabilization programs, and increased rates of sea-level rise) also makes them among the most at risk for endangered and threatened status designations. For this reason, the ENSP has focused its efforts on better understanding the distributions and populations of these species. In 2011 and 2012, the ENSP participated in the region-wide efforts of the Saltmarsh Habitat and Avian Research Program (SHARP) by conducting call playback and acoustic recording surveys. The data gathered have helped fill information gaps in the northeast coastal region of the United States for this species group, has encouraged the southeast coastal region to undertake a similar survey, and are the basis of the Eastern Saltmarsh Bird Business Plan. In 2015 and 2016, the ENSP conducted call playback and acoustic recording surveys that focused on black rails, the most critically imperiled species of this group (and in all of North America). These data have informed the in-progress status assessment and related tasks supporting a finding for federal listing.

Aerial Surveys for Wading Birds, Terns, and Gulls

Surveys of wading birds (herons and egrets), terns, and gulls took place in 2007-2008, 2010-2011, and 2013-2016, adding to a long-term dataset that New Jersey has maintained since the 1970s. These surveys highlight the response of these species to changes in their environment, particularly those related to sea-level rise and marsh subsidence. Some marsh islands have disappeared completely while others have been abandoned by the birds – likely in part because of flooding and storm tide conditions that have worsened over the last few decades. These surveys have helped New Jersey researchers and conservation agencies understand how the spatial distribution of these species has changed and highlights where to focus efforts to help these species adapt to the current and future changes in habitat.

Responsibility for International Bird Migrations

The Delaware Bay migration stopover hosts hemispheric populations of six arctic-nesting shorebirds including the federally-threatened red knot. New Jersey, Delaware, the New Jersey Natural Lands Trust, and the Conserve Wildlife Foundation of New Jersey have partnered on research, protection, and habitat restoration efforts since 1997. Our work identified horseshoe crabs and their eggs as the principal food resource for migrant shorebirds, and documented the decline in the red knot population following horseshoe crab overharvest. Our research, which contributed to the 2007 Red Knot Status Assessment, helped stem declines of red knots (stable at 25,000) and contributes to biological models that set less damaging horseshoe crab harvest quotas. The ENSP further collaborated on international geolocator and nanotag telemetry projects that identified migration routes, stopovers, and wintering sites for red knots and ruddy turnstones in the Western Atlantic Flyway. These data inform the Atlantic Flyway Shorebird Initiative and international conservation actions.

Bog Turtles – Restoring an Endangered Species

In partnership with other agencies such as the U.S. Fish & Wildlife Service (USFWS) and the U.S. Department of Agriculture's Natural Resources Conservation Service, the DFW is working to restore federally threatened bog turtle populations through a program that uses cooperative agreements with landowners to restore and protect valuable wetlands habitats. One innovative program pioneered and perfected in New Jersey was the restoration of wetland habitat through prescribed grazing. Hundreds of acres have been restored or enhanced through these cooperative programs. Targeted land protection directed by the DFW's mapping and habitat assessment work has also significantly aided the recovery of this species.

Working with Experts to Track Rare Butterflies and Moths

ENSP biologists conducted targeted surveys to find new and assess the persistence of known rare butterfly populations. Frosted elfin, arogos skipper, and other species were documented in surveys conducted with assistance from the North American Butterfly Club-North Jersey Chapter and the South Jersey Butterfly B/Log contributors. The ENSP has promoted habitat management for these site-specific butterflies on more than 1,000 acres of state and federal lands with good success. Also, ENSP biologists created the Rare Moth Species of New Jersey list with assistance from moth experts. New Jersey is home to at least 56 species of rare and endangered moths that are of conservation concern, and this list is the first step to conservation planning.

Mapping Freshwater Mussels

Freshwater mussels have been on New Jersey's radar for many years as they are one of the most endangered taxa in the country. ENSP biologists have mapped the highest quality streams and documented suitable habitat for the state's endangered, threatened, and special concern mussels using the Landscape Project. Secretive and sensitive species can be our most vulnerable wildlife, so identifying their locations and monitoring populations are the first steps to conservation actions. The ENSP's work has helped to classify streams as Category 1, which gets the highest level of regulatory protection. We also completed an analysis of more than 10 years of habitat data that will be used to identify critical mussel areas suitable for stream restoration efforts.

American Kestrel

American kestrel populations have declined precipitously over the past several decades for many reasons. In 2004, the ENSP surveyed suitable habitats and the findings were alarming: only nine of the 100 routes surveyed for kestrels were positive. It is believed one of the greatest limiting factors for kestrels is the lack of suitable nesting locations; they are secondary cavity nesters, which means that they make their nests in naturally occurring cavities or in ones left behind by woodpeckers. In 2006, the ENSP began a nest box program in which much of the monitoring is conducted by volunteers. At the peak of the project close to 300 boxes were monitored, but since 2010 the ENSP has monitored a subset of about 150 of the most productive boxes, many of which are hosted by private landowners and nonprofit partners. Over the course of the project, 1,048 fledglings were banded, and 248 adults were captured for banding and identification. The ENSP also led a geolocator study in which 15 geotags were deployed in 2013 (with five recovered in 2014) and five more were deployed in 2015 (with two recovered in 2016). Six of the seven recovered tags were from live captured birds, and of these birds, three had migrated to Florida for the winter while three remained in the Northeast.

Cessation of Trout Stocking to Restore Native Brook Trout Populations

The DFW discontinued stocking trout in eight small trout production streams between 2005 and 2010. This management action was taken to protect New Jersey's wild trout resources, particularly brook trout (the only salmonid native to New Jersey), and to better utilize hatchery trout in waters not having self-sustaining trout populations. In 2013, these eight streams were surveyed at sites where surveys had been conducted prior to 2002 to obtain comparative data. Two of the streams surveyed in 2013 no longer had wild brook trout and the populations in two other streams were considered fragile due to low abundance. Restoration (both translocation of wild fish and habitat enhancement) was recommended for these four streams. Of the four remaining streams, either no action or consideration of special trout fishing regulations was recommended.

Conservation and Restoration of Fish Habitat

In order to protect New Jersey's critical aquatic resources, fisheries biologists participate in or provide input on a variety of projects each year. Bureau of Freshwater Fisheries staff provide technical assistance related to conservation, stream restoration, dam removal projects, and land use projects. Rivers that have recently benefited from dam removals include the Musconetcong and Raritan Rivers, while efforts are underway for additional removals on the Millstone and Paulins Kill Rivers. Land use projects are coordinated through the DFW's Environmental Review Program. This input is directed towards minimizing land use change impacts to the state's fisheries resources. This is typically accomplished through the use of timing restrictions during critical fish spawning periods, protection of riparian buffers, and project modifications that ensure best use practices are implemented at all times. In addition, more in-depth reviews and comments are provided for selected projects.

Fish Index of Biotic Integrity for New Jersey's Lower Delaware River Drainage

From 2000 through 2006, the Bureau of Freshwater Fisheries developed and validated a fish Index of Biotic Integrity (IBI) for wadeable streams in New Jersey's Lower Delaware River Drainage. An IBI is a tool that utilizes the empirical response of fish assemblages to anthropogenic stressors to get an indication of stream health and biological condition. This is

important for protecting water quality and water-dependent species that do not fulfill Category 1 requirements (as the Category 1 designation is most often based on the presence of reproducing trout). The new IBI is composed of 10 metrics accounting for species richness and composition, indicator species, trophic composition, and fish abundance. Data were analyzed from 148 electrofishing surveys conducted during the summers of 2000 through 2006. The NJDEP's Bureau of Freshwater and Biological Monitoring also developed and implemented two other IBIs specific to northern New Jersey streams and headwater streams. The NJDEP uses IBIs to assess cumulative impacts on streams and to communicate the condition of stream ecosystems to citizens and policymakers, thus helping all concerned communities to contribute to sound environmental policies.

Freshwater Permits

The Bureau of Freshwater Fisheries annually reviews and issues more than 400 permits to ensure the effective management and protection of the state's aquatic resources. These permits encompass nine specific permit types including commercial harvest of aquatic species, water level management (for the protection of aquatic species), the introduction of aquatic species, collection of aquatic species for scientific purposes, and special use permits. The permit process not only helps protect freshwater fish, but also other aquatic species such as frogs and turtles during critical spawning and hibernating periods.

Mapping Native Fish Species

The Bureau of Freshwater Fisheries created the state's first comprehensive fish species distribution maps utilizing more than 50 years of fisheries data (managed within FishTrack, a computerized freshwater fisheries database) and compiling data from 2000-2012. This was particularly useful when using the Delphi Technique for species status reviews.

Minimum Size on Trout Increased

The statewide minimum size limit for brook, brown, and rainbow trout was increased from 7 to 9 inches in 2008. The minimum size was adjusted to afford naturally reproducing trout populations in small streams a greater level of protection, as many of these populations have small numbers of spawning adults that seldom exceed 9 inches.

Potentially Dangerous Fish

Dangerous species are those that are not native to an ecosystem and whose introduction would likely cause economic or environmental harm or harm to human health. New Jersey statutes prohibit the possession or release of live, potentially dangerous animals, but no fish species were listed prior to 2010. This was addressed when the DFW and Fish and Game Council listed 10 fishes under the term "Potentially dangerous exotic fish" in N.J.A.C. 7:25-6.2. The species are: Asian swamp eel, bighead carp, brook stickleback, flathead catfish, grass carp (diploid), green sunfish, snakeheads, Oriental weatherfish, silver carp, and warmouth. The possession of these species is now prohibited under N.J.A.C. 7:25-6.1(g). The regulation states that anglers must destroy these species if encountered while fishing and are directed to submit specimens or photographs to the Bureau of Freshwater Fisheries. This requirement is intended to raise invasive species awareness, alert fisheries staff to new occurrences, and help curtail the spread of invasive species before they become established. The Bureau of Freshwater Fisheries has several ongoing surveillance and removal efforts for many of these species.

Prohibition of the Possession of Acid Tolerant Sunfish

In 2008, the DFW and the Fish and Game Council implemented a regulation to prohibit the possession of four sunfish species (mud sunfish, blackbanded sunfish, bluespotted sunfish, and banded sunfish) under N.J.A.C. 7:25-6.13(u). These species are in decline throughout their native ranges and New Jersey's Pinelands are currently a stronghold for them. Threats to these species include land use changes that increase pH and nutrient loads in waterbodies, loss of native aquatic vegetation, and competition and predation by non-native fishes. Prior to this regulation, there was no creel or size limit restrictions for these attractive species that are targeted by aquarium hobbyists.

Status Evaluation of Native Freshwater Fishes

A formal review process that applied the Delphi Technique was led by the ENSP in 2014 and 2015 to determine the status of New Jersey's native freshwater fishes. The Delphi Technique is a systematic method for reaching consensus among experts in which absolute, quantitative answers are either unknown or unattainable. By structuring the communication process, the Delphi Technique helps the group reach a consensus of opinion by incorporating all available data and disseminating those data among all participants. The results of this review process, in conjunction with recommendations by Bureau of Freshwater Fisheries staff on non-consensus species, were approved by the Endangered and Nongame Species Advisory Committee and are as follows:

- Endangered – bridle and ironcolor shiners;
- Threatened – slimy sculpin; and
- Special Concern – American brook lamprey, blackbanded sunfish, brook trout, comely shiner, mud sunfish, northern hog sucker, and shield darter.

The next step will be to formally adopt the recommended statuses of each native freshwater fish into the New Jersey Administrative Code (N.J.A.C.).

Stream Temperature Monitoring

In 2013, the Bureau of Freshwater Fisheries established an ambient stream temperature monitoring network on streams having coldwater fisheries that are of conservation interest, specifically those with Focal SGCN (brook trout and slimy sculpin) or of recreational importance. The data collected will be used to assess current temperature conditions, evaluate long-term trends, determine if ambient water quality is consistent with the NJDEP's Surface Water Quality Standards, and aid in the management of coldwater fisheries. Integral to the establishment of this monitoring network was the development of a Quality Assurance Project Plan that complied with the NJDEP's regulations concerning the certification of laboratories and environmental measurements under N.J.A.C. 7:18-1 et seq., which was approved by the NJDEP's Office of Quality Assurance in July 2013. By 2015, ongoing monitoring was occurring at 39 sites. Five of these sites had wild brook trout populations and complemented the Eastern Brook Trout Joint Venture initiative to assess climate change using paired water/air thermographs.

Surface Water Classification Assessments

Trout are useful bioindicators of stream health as excellent water quality and habitat are necessary for their survival and successful reproduction. In 1968, the Bureau of Freshwater Fisheries initiated the process of identifying and classifying New Jersey waters according to their suitability to support trout. Five years later, a classification system for New Jersey waters was

developed. The Bureau of Freshwater Fisheries' classification system, although already in use by various programs within the DFW was formally recognized in 1981 under the state's newly adopted Surface Water Quality Standards. The NJDEP's Land Use Regulation Program, through stream encroachment, freshwater wetlands, and stormwater rules, acknowledges the fragile nature of these ecosystems and provides additional protective measures. The classification of New Jersey's rivers and streams is updated by the NJDEP using the DFW field data on their trout supporting capabilities.

Targeted Surveys of Rare Fishes

The Bureau of Freshwater Fisheries annually conducts approximately 200 fisheries surveys for a variety of projects throughout the state. These data are valuable in the understanding the status and distribution of our native species. In addition, the Bureau of Freshwater Fisheries has focused on several rare fish species in recent years to determine the extent of their current range, primarily focusing on historical locations in which they occurred. Since 2005, the Bureau has conducted more than 140 fisheries surveys looking specifically for rare species such as bridle and ironcolor shiners, along with several species primarily restricted to the Pinelands such as the blackbanded sunfish. This information is critical for other projects such as the statewide mapping of native species, using the Delphi Technique for species status reviews, and State Wildlife Action Plan updates.

Wild Trout Stream Regulation Assessment

The DFW has documented reproducing trout populations in nearly 200 streams (or stream segments) statewide, but only 36 are currently designated as Wild Trout Streams. These streams are not stocked with hatchery trout, but rather rely upon their wild, naturally reproducing trout populations to provide a recreational fishery. The Wild Trout Streams regulation is more stringent than the statewide general trout regulation and has changed little since it was adopted in 1990. Currently, the regulation provides for a limited harvest of only two trout daily, from the Opening Day of the trout season in April through September 15. The minimum size limit on trout is 9 inches in most of these streams. Fishing gear restrictions also apply (artificial lures only, no bait or bait scent allowed). In 2014 a multi-year assessment was initiated to review the Wild Trout Streams regulation, collect and analyze data, and develop regulations that will better address recreational fishing opportunities for, and conservation needs of, the state's wild trout fisheries, with anticipated regulation changes in 2018.

Shortnose and Atlantic Sturgeon

In 2010, New Jersey, Delaware, and Connecticut, along with academic and private collaborators, partnered to develop a multi-year effort entitled "Sturgeons in the Mid-Atlantic Region: A Multi-State Collaboration of Research and Conservation" directed at providing state, federal, and regional management authorities with information necessary to conserve and ultimately restore populations of federally endangered Atlantic and shortnose sturgeons in the mid-Atlantic region. The project focus was to conduct targeted activities that would not only benefit regional managers but would provide infrastructure and data management capabilities for sturgeon researchers and managers on a coastwide basis. Bureau of Marine Fisheries staff, along with the ENSP and contractors, deployed and maintained acoustic telemetry receivers in the Delaware Bay and river, allowing biologists to develop a more detailed picture of sturgeon movement and habitat use throughout the Delaware River estuary. In addition, we confirmed a shortnose

sturgeon spawning area using an early life stage collection and adult tracking effort. Data from the sturgeon project were entered into the Biotics database and applied to the latest version of the Landscape Project to inform management, regulatory, and permitting decisions. Receiver data were also provided to the Atlantic Cooperative Tagging Network and Atlantic States Marine Fisheries Commission's Sturgeon Technical Committee for stock assessments.

Allegheny Woodrat

Since 1987, ENSP biologists have monitored the last remaining Allegheny woodrat population in the state. With the population index remaining low since 2007 and a genetic assessment completed in 2014 indicating that the population was showing significant signs of genetic isolation, the ENSP, with the endorsement of a team of woodrat experts from New York, Pennsylvania, and Indiana, collaborated with the Pennsylvania Game Commission on two translocation efforts in 2015 and 2016 to serve as a "genetic rescue." An updated genetic assessment planned in early 2017 will enable us to assess the effectiveness of these efforts. In 2015, the ENSP, with the help of Montclair State University, AmeriCorps members, and the Palisades Interstate Park Commission, also implemented a spatially extensive, year-round anthelmintic bait deployment as a mitigation strategy to try to keep raccoon roundworm infection, a serious mortality factor for woodrats, at bay. The population index in 2016 was the highest it has been since the peak in the early 2000s, so we are hopeful that these efforts are helping the population. In 2016, Montclair State University started supporting two graduate students who are focusing their thesis work on helping the ENSP with Allegheny woodrat research and management in the Palisades as well as investigating historic woodrat sites in New Jersey. Also in 2016, the ENSP and Montclair State University began collaborating on research to assess the habitat in both active and extirpated Allegheny woodrat sites in New Jersey, Maryland, and Pennsylvania, as well as assess the prevalence of raccoon roundworm at those sites.

Habitat Change Analysis

Habitat loss and fragmentation continue to be the two most serious threats to wildlife populations. To effectively protect endangered and threatened species populations and to evaluate protection and management efforts, wildlife agencies need to identify and monitor habitat for each listed species. With this in mind, the DFW adopted a habitat change analysis approach to track wildlife habitat transition and fragmentation trends over time. The analysis uses GIS to identify potential habitat from available land use and land cover data based on species habitat associations and range extents. The analysis spans four time periods between 1986 and 2012. Products from the analysis include up-to-date, multi-level, species-specific habitat change information to support agency initiatives. Resulting maps and data serve as a guide to help prioritize work for particular species and their habitats, and provide baseline information for the development of species status assessments and recovery plans. Outputs also provide a basis for additional analyses such as evaluating habitat change in regulated versus unregulated areas, evaluating habitat conservation planning efforts, and other land-use planning, land management, and preservation efforts.

Connecting Habitat Across New Jersey (CHANJ)

In response to the significant threat posed by increasing habitat loss and fragmentation, the state's dense road network, and a changing climate, the DFW formed a multi-partner, multi-

disciplinary working group in 2012 called Connecting Habitat Across New Jersey, or CHANJ. CHANJ is made up of representatives from more than 40 agencies across the state, including the New Jersey Department of Transportation (DOT) and other state, federal, local, academic, and nonprofit organizations. The group has been informing the ENSP's development of a strategic plan for wildlife conservation that will identify key areas and the actions needed for preserving and restoring habitat connectivity for terrestrial wildlife in New Jersey. Core teams (Mapping, Guidance Document, and Communication) have been meeting and communicating regularly to develop the project and its capstone tools – a mapping system and a guidance document. Now in their final stages of development, these products will allow land-use, conservation, and transportation planners to operate in a more collaborative way to increase road safety, streamline permit efficiency, and ultimately improve the prospects for the long-term sustainability of New Jersey's terrestrial wildlife.

The ENSP has also been organizing regular meetings of a Roads and Wildlife Working Group made up of CHANJ partners from the New Jersey DOT, the USFWS, and the NJDEP's Land Use Regulation Program since 2009. This group has focused on developing and implementing strategies to reduce the impact of roads on wildlife. The group has been developing a Roads/Wildlife Toolkit that will consist of: (a) CHANJ maps that incorporate road segments intersecting habitat cores and corridors; (b) road segment assessments; (c) culvert inventory data; (d) road/wildlife best management practices; and (e) a Road/Wildlife Mitigation Projects database. Once completed, the toolkit can be used by counties and municipalities, Metropolitan Planning Organizations, and the New Jersey DOT to help plan and implement road and wildlife work as part of CHANJ.

Species Status Reviews

In addition to the recent status assessment of freshwater fishes (described above), ENSP biologists coordinated status reviews of freshwater mussels, crayfish and fairy shrimp, dragonflies and damselflies, reptiles and amphibians, birds, and terrestrial and marine mammals. The state adopted changes to legal listings that were recommended prior to 2011. The legal list changes included:

- adding five species to the endangered list (black rail, golden-winged warbler, red knot, Indiana bat, gray petaltail dragonfly);
- adding nine species as threatened (banner clubtail, brook snaketail, harpoon clubtail, Kennedy's emerald, robust baskettail, superb jewelwing, American kestrel, cattle egret, horned lark);
- adding 34 species as special concern (one mussel, 33 dragonflies/damselflies and butterflies); and
- upgrading eight species, including Cooper's hawk, from threatened or endangered to special concern or stable.

Changes to species statuses that were evaluated since 2011 will be made following the 2016-17 review of birds due to the lengthy rulemaking procedure that was completed in February 2012.

B. Accomplishments by Conservation Groups and Agency Partnerships

Habitat Management

Thousands of acres of land were in some way positively affected by the hard work of New Jersey's conservation partners and individual landowners. Management activities occurred on

more than 40,000 acres, benefitting not only the forests, grasslands, aquatic systems, and other habitats, but the wildlife that depend upon these landscapes, including songbirds, raptors, reptiles, amphibians, fish, mammals of all sizes, and more. Their efforts included the following projects:

- Restoring and managing grassland, early successional, wetland, and riparian habitats to benefit grassland birds, other bird species, and various wildlife species through periodic mowing, prescribed burns, and other techniques.
- Integrating conservation practices on agricultural lands to increase grassland habitat for grassland birds and other wildlife, with support from federal and state incentive programs.
- Controlling invasive species to improve native growth by removing vegetation such as Phragmites and managing woody vegetation.
- Managing and planting native vegetation on rights-of-ways.
- Re-contouring, planting, and modifying degraded lake and stream shorelines to enhance water quality and wildlife habitats.
- Restoring a freshwater tributary and surrounding woodlands.
- Restoring salt marsh habitat.
- Improving habitat for rare turtles and snakes through habitat management and, where it was appropriate, drainage improvements.
- Creating a 1,000 sq. ft. rain garden to serve as an outdoor classroom for programs about wildlife habitat and water filtration systems.
- Conducting nonpoint source pollution control and stormwater management.
- Managing resident Canada goose populations on 2,700 acres to preserve lakeshore habitat and biodiversity.
- Construction of an under-road turtle passage to reconnect two pieces of protected land for state-threatened wood turtles.
- Installing wildlife crossing structures under the Atlantic City Expressway with the South Jersey Transportation Authority, conducting monitoring, and having data analyzed by the ENSP and Montclair State University to increase the effectiveness of structures for passing wildlife.
- Managing forests to increase the diversity and understory vegetation on private and public lands to benefit a suite of species that depend on interior forests with diverse age classes.
- Advancing the Eastern Brook Trout Joint Venture partnership by:
  - identifying key threats to brook trout and their habitats;
  - developing conservation strategies to protect, enhance and restore brook trout;
  - refining subwatershed status maps to the catchment scale; and
  - conducting surveys to assess the status of brook trout and their habitats, and sharing the data between agencies and partners.

Research

Some partners conducted wildlife research across almost 90,000 acres to help provide a better understanding of species statuses, ranges, and habitat needs including, but not limited to:

- Acoustic surveys to determine bat presence, species, and important roost sites;
- Breeding songbird surveys to monitor population trends and identify critical habitats;

- Monitoring semipalmated sandpipers as they make their spring stopover on the Delaware Bayshore to track the health and status of this international migrant;
- Inventories of reptiles and amphibians;
- Identification and certification of important vernal pool habitats critical to the persistence of many of New Jersey's amphibian species;
- Identification of roadkill hot-spots and mitigation strategies for reptiles and amphibians;
- Raptor surveys and monitoring including radio-tracking bald eagles to identify important roost sites;
- Banding ospreys to continue long-term monitoring of the state's population;
- Surveys to monitor lake trout health;
- Breeding songbird surveys to evaluate management of forested landscapes to increase the diversity and understory vegetation on private and public lands; and
- Research on northern pine snake baseline populations, genetics, habitat use, den population dispersals, and overwintering and nesting successes conducted by academics and private researchers with support from the DFW – this information will help the DFW map habitats and population corridors to secure this species in New Jersey's unique Pine Barrens, an Eastern U.S. stronghold for pine snakes.

Research: Wildlife disease

- The devastating bat disease white-nose syndrome emerged in North America in 2006 as the result of a foreign-borne fungus (*Pseudogymnoascus destructans*). It was discovered in New Jersey's most important bat hibernacula in January 2009. The DFW and partners have since been monitoring the impacts of the disease on the state's cave-hibernating bat species, some of which have suffered declines of more than 95%. Research on bat survivorship, winter body condition, reproduction, and summer distribution of under-studied species like the northern myotis have been underway and will continue into the foreseeable future.
- The ENSP funded Montclair State University through a small grant to sample amphibians for Bd (*Batrachochytrium dendrobatidis*) in 2009, and two out of 27 samples tested positive. An additional 399 samples were collected by ENSP and Conserve Wildlife Foundation of New Jersey staff in 2011 and 2012 and analyzed by Montclair with no additional positive detections.
- Through a Regional Conservation Need grant, the ENSP contracted with the Conserve Wildlife Foundation of NJ to sample wood frogs for Ranavirus in 2013 and 2014. During the study period, Ranavirus was detected in eight populations of wood frogs across four counties. Including a documented Ranavirus occurrence from 2011 by Montclair State University, the ENSP is aware of nine positive Ranavirus detections in the state.
- The DFW partnered with the Wildlife Conservation Society and later participated in a multi-state, multi-organization research effort to determine the distribution of Snake Fungal Disease (SFD) and the affected species. Over three seasons of surveys, SFD was confirmed in timber rattlesnake, corn snake, northern pine snake, black rat snake, coastal plain milk snake, and eastern milk snake, and was suspected in northern copperhead. These findings confirmed SFD presence in Bergen, Passaic, Warren, Burlington, and Ocean Counties, and symptomatic snakes were observed in Sussex County.

- Year-round anthelmintic bait was deployed around the last remaining active Allegheny woodrat site in an effort to keep raccoon roundworm (a serious mortality factor for woodrats) at bay.

Research: Marine Fisheries

- The New Jersey Marine Fisheries Administration, in cooperation with Rutgers and Stockton universities, initiated a study in 2016 with the goal of collecting biological data on various life stages of commercially and recreationally important species of fish managed by the NJDEP and the Atlantic States Marine Fisheries Commission. Participants are actively collecting biological and environmental data through the use of seine-net, fyke-net, plankton-net, fish-trap, trawl, and gill-net surveys.
- In 2016, the New Jersey Marine Fisheries Administration and Rutgers University began a pilot study to characterize the seasonal and spatial variation in the composition and abundance of structure-associated species of marine fish and invertebrates present on the Sea Girt and Little Egg artificial reefs. The study uses fish traps to collect biological data that can be used by fisheries managers to assist them in stock assessments for black sea bass, tautog, and American lobster.
- Since 2012, the New Jersey Marine Fisheries Administration has deployed acoustic receivers in Delaware Bay to track migration patterns of Atlantic sturgeon. As part of a multi-state collaborative effort, the DFW has partnered with several states to develop a multi-year effort directed at providing state, federal, and regional management authorities with information necessary to successfully conserve and ultimately restore the population of sturgeon in the mid-Atlantic region.
- The Delaware River Basin Fish and Wildlife Management Cooperative (New York, New Jersey, Delaware, Pennsylvania, the U.S. Fish and Wildlife Service, and the National Marine Fisheries Service) monitors the American shad population in support of its sustainable fishery plan through a variety of fishery dependent and independent surveys conducted by the states both individually and together. New Jersey contributes American shad young of the year data from the tidal portion of the Delaware River, records commercial harvest of American shad in the Delaware Bay, and participates in the Wildlife Management Cooperative's young of the year seine survey in the non-tidal portion of the Delaware River. The data collected from New Jersey's surveys are combined with those of the other member states to determine trends in fish abundance and allow fishery managers to develop appropriate management measures.

Education and Outreach

The ENSP and its many partners undertook a vast array of educational efforts to advance conservation, including:

- Creating and coordinating environmental workshops and outdoor-classroom programs;
- Educating the public about responses to emergency marine mammal and sea turtle strandings;
- Using volunteerism, field programs, online story maps, and social media to rally support for solutions to road-wildlife conflicts, such as crossing structures for migratory amphibians and turtles; and
- Educating homeowners and Nuisance Wildlife Control Operators about the proper handling of bats in buildings by offering training programs, providing New Jersey-

specific online resources, and providing free bat boxes; and teaching citizens and students how backyard habitat management, even in schoolyards, can benefit wildlife and local ecosystems.

This page intentionally left blank

CHAPTER 1: NEW JERSEY'S MOST VULNERABLE WILDLIFE

I. Process for Selecting SGCN and Focal SGCN

New Jersey is home to more than 3,700 wildlife species, from monarch butterflies to blue whales. Some species are stable or have growing populations. Others are rare, perhaps naturally because they live in unusual habitats, or perhaps due to changing or disappearing habitats.

A challenge for all wildlife managers is determining where and how to direct limited resources to best support the full range of wildlife diversity in New Jersey. This State Wildlife Action Plan is an important step to guiding conservation activities, whether they are implemented by state agencies, nonprofit organizations, neighborhood groups or private landowners.

The following subsection explains the review and assessment processes that were used to identify Species of Greatest Conservation Need (SGCN) from the full list of New Jersey's wildlife species. Subsequent subsections outline how the SGCN list was further refined into Priority SGCN, then "Upper Tier" SGCN, and finally Focal SGCN. A graphic depiction of the selection process is included as Figure 1, below.

A. Selecting Species of Greatest Conservation Need (SGCN)

An early step in the planning process was identifying Species of Greatest Conservation Need (SGCN). This list was first developed in 2005 as part of New Jersey's initial State Wildlife Action Plan. SGCN are wildlife most in need of active support to ensure that they remain part of the state's biological heritage. These at-risk birds, mammals, reptiles, amphibians, fish, and invertebrates were acknowledged as SGCN due to their low or declining populations and vulnerability to threats. Without actions to conserve them, SGCNs are likely to decline further over the next 10 years, possibly moving them closer to endangerment or extirpation.

The SGCN list was first developed by evaluating all of New Jersey's native, indigenous wildlife species using the best available assessments of their conservation statuses and trends within the state, the Northeastern U.S., and beyond. The assessment for each taxonomic group was tailored using the best available data for that specific group. In general, the assessments drew on state and federal listing statuses, status assignments by the International Union for the Conservation of Nature (IUCN), published evaluations by taxonomic expert groups, and taxonomic conservation plans that listed or ranked at-risk species based on a variety of vulnerability factors. The criteria used to select SGCN are presented in detail in Appendix A.

A species meeting any one or more of the assessment criteria for their taxonomic group was included on New Jersey's SGCN list. For example, any species that was state or federally listed, or that was on the IUCN Red List as "Near Threatened" through "Critically Endangered" was identified as an SGCN. At the taxonomic level, any bird on the Partners in Flight "Watch List" and any insect on the Xerces Society "Red List" was included.

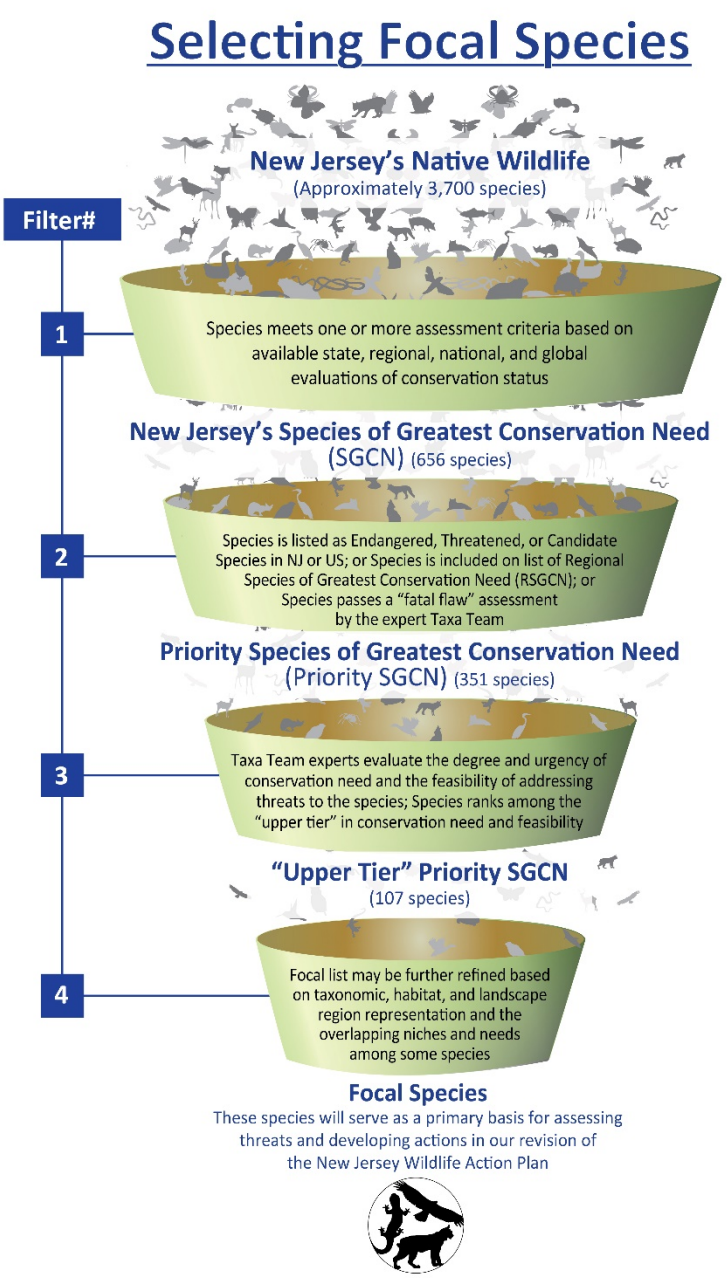


Figure 1: Process for selecting SGCN and Focal SGCN.

The initial SGCN list in the 2006 Plan (and in the 2008 Revised Plan) included 289 species. After using new criteria to review all species for this revised plan, the DFW identified 656 species as SGCN. The full SGCN list is provided in Appendices B and C, and a brief discussion of the changes between the two lists is presented in Section III of the Introduction, "2017 Changes to the State Wildlife Action Plan."

While comprehensive, at 656 species the SGCN list is too big for an effective State Wildlife Action Plan with achievable goals. The ENSP therefore refined the list using the SGCN as the foundation for a 2-tiered filtering process to identify Focal SGCN. For each tier, a team of taxonomic experts assessed each species' conservation need and the feasibility of successful conservation actions.

B. Selecting Priority SGCNs

The DFW conducted the first filtering tier which refined the SGCN list down to Priority SGCN. These species included wildlife that:

a. were listed as endangered, threatened, or candidate species in New Jersey or federally;
b. were included on the Regional Species of Greatest Conservation Need list for the USFWS Northeast Region; or
c. could be advanced through a fatal-flaw assessment that took into account practical knowledge of the species and New Jersey's importance to its regional and global status.

Through this filtering process, the full list of SGCN was refined to 351 Priority SGCN that were in clear and immediate need of conservation action. These species are distinguished from the initial 656 SGCN in Appendix B.

C. Selecting "Upper Tier" Priority SGCN and Focal SGCN

The DFW next conducted the second filtering tier which refined the Priority SGCN list down to "Upper Tier" Priority SGCN. This process looked more closely at conservation needs and the feasibility of actions to address the threats faced by each Priority SGCN.

Conservation need was assessed by considering (1) the level of concern for the species across its range in the Northeastern U.S., and (2) New Jersey's responsibility for the species' persistence range wide. For most species, the northeast regional scores followed the Northeast Regional Conservation Synthesis ranking by Terwilliger Consulting. This ranking ranged from "Very High" to "Low" based on the percentage of northeastern states within the species' range where it was of conservation concern. For species that were not ranked in the Synthesis (most notably insects), scores were based on population trends and the risk of extirpation from New Jersey. New Jersey's responsibility scores were based on the percentage of the species' North American range that occurred in the Northeastern U.S. and/or the risk of regional extirpation or extinction if the species were lost from the state.

The feasibility of actions was measured by (1) assessing whether potential actions had been shown to benefit the species elsewhere and (2) projecting the likelihood that the actions would succeed if applied in New Jersey. A high likelihood of success assumed that the tools, work force, ability, funding, and collective will to act were present.

Next, the review teams assigned each of the initial "Upper Tier" SGCN to a taxonomic sub-class (e.g., birds were divided into landbirds and waterbirds, invertebrates to insects and non-insects, etc.). Then, they indicated in which of the state's six Landscape Regions and nine broad habitat types each species occurred.

Finally, the remaining SGCN list underwent a fatal-flaw analysis to ensure that scores for conservation need emphasized need in New Jersey. This final review by the State Wildlife Action Plan executive committee and the DFW SGCN team focused the final list on species that would most benefit from concerted conservation action in New Jersey.

The outcome of this filtering process was a final Focal SGCN list with 107 species:

a. that were state and regional priorities;
b. for which there was a notable capacity to positively affect their long-term persistence; and
c. that represented the broad taxonomic groups, habitat types, and landscapes across New Jersey.

Species profiles for the 107 Focal SGCN can be found in Appendix D. The profiles include information regarding each species' distribution, abundance, and population trend within New Jersey. They also note additional plans that have valuable conservation information, and note the primary and supporting habitats that are important for the Focal SGCN's survival. Although the

NJDEP's Land Use/Land Cover data layer includes finer-scale habitat information, the DFW used broader categories for this 2017 Plan to characterize each species' habitat use. These categories were:

- *Forest* (including deciduous and coniferous forests)
- *Grassland* (including natural grasslands and agricultural lands)
- *Shrub*
- *Wetlands* (including freshwater emergent marshes, forested wetlands, and tidal wetlands)
- *Barren and Exposed Rock*
- *Cold Water Stream* (including cold water rivers and oligotrophic lakes)
- *Warm Water Stream* (including warm water rivers and most ponds and lakes)
- *Beach and Dune* (including intertidal beach areas down to mean low water)
- *Tidal Flat* (including intertidal areas of mud or sand exposed during low tide)
- *Marine Near Shore Zone* (including subtidal waters seaward from the mean low water line to well beyond the breaker zone, and landward into subtidal waters of back-bays, coastal bays, lagoons, etc.)
- *Marine Off Shore Zone*, meaning (for the purposes of this plan) the zone extending seaward from the Marine Near Shore Zone.

New Jersey's wildlife habitat types are further discussed in Chapter 2.

D. Individual Focal SGCN and Guilds of Focal SGCN

Recognizing that synergies exist between species with overlapping habitats, the 107 Focal SGCN were grouped by the expert taxonomic teams into guilds that reflected similarities in the species' taxonomies, ecological requirements, threats, and actions needed to conserve them. This assessment categorized 77 of the species into 18 groupings, while the remaining 30 species remained ungrouped.

This final categorization produced a list of 48 individual Focal SGCN and guilds of Focal SGCN provided in Table 1.

Table 1. New Jersey's Focal Wildlife Species of Greatest Conservation Need

MAMMALS

Terrestrial Mammals

Conservation Target (Not Grouped)

Allegheny Woodrat, *Neotoma magister*

Conservation Target

Cave-hibernating Bats

Indiana Bat, *Myotis sodalis*
Little Brown Bat, *Myotis lucifugus*
Northern Myotis, *Myotis septentrionalis*

Marine Mammals

Conservation Target (Not Grouped)

North Atlantic Right Whale, *Eubalaena glacialis*

BIRDS

Landbirds

Conservation Target (Not Grouped)

Northern Harrier, *Circus cyaneus*
Peregrine Falcon, *Falco peregrinus*
Red-headed Woodpecker, *Melanerpes erythrocephalus*

Conservation Targets

Forest Birds

Cerulean Warbler, *Dendroica cerulea*
Kentucky Warbler, *Oporornis formosus*
Prothonotary Warbler, *Protonotaria citrea*
Scarlet Tanager, *Piranga olivacea*
Wood Thrush, *Hylocichla mustelina*

Grassland Birds

Bobolink, *Dolichonyx oryzivorus*
Eastern Meadowlark, *Sturnella magna*
Grasshopper Sparrow, *Ammodramus savannarum*
Vesper Sparrow, *Pooecetes gramineus*

Young Forest Birds

American Woodcock, *Scolopax minor*
Blue-winged Warbler, *Vermivora pinus*
Golden-winged Warbler, *Vermivora chrysoptera*
Northern Bobwhite, *Colinus virginianus*

Waterbirds

Conservation Target (Not Grouped)

Pied-billed Grebe, *Podilymbus podiceps*

Conservation Targets

Beach-nesting Birds

American Oystercatcher, *Haematopus palliatus*
Black Skimmer, *Rynchops niger*
Least Tern, *Sternula antillarum*
Piping Plover, *Charadrius melodus*

Marsh Birds

Black Rail, *Laterallus jamaicensis*
Common Tern, *Sterna hirundo*
Forster's Tern, *Sterna forsteri*
Little Blue Heron, *Egretta caerulea*
Snowy Egret, *Egretta thula*
Tricolored Heron, *Egretta tricolor*

Migrant Shorebirds

Red Knot, *Calidris canutus*
Ruddy Turnstone, *Arenaria interpres*

REPTILES & AMPHIBIANS

Reptiles

Conservation Targets (Not Grouped)

Bog Turtle, *Glyptemys muhlenbergii*
Eastern Box Turtle, *Terrapene carolina carolina*
Eastern Hognose Snake, *Heterodon platirhinos*
Eastern Redbelly Turtle, *Pseudemys rubriventris*
Northern Black Racer, *Coluber constrictor constrictor*
Northern Diamondback Terrapin, *Malaclemys terrapin terrapin*
Timber Rattlesnake, *Crotalus horridus*
Wood Turtle, *Glyptemys insculpta*

Conservation Targets

Marine Turtles

Atlantic Green Turtle, *Chelonia mydas*
Atlantic Leatherback, *Dermochelys coriacea*
Atlantic Loggerhead, *Caretta caretta*
Atlantic Ridley, *Lepidochelys kempii*

Pine Barrens Snakes

Corn Snake, *Elaphe guttata guttata*
Northern Pine Snake, *Pituophis melanoleucus melanoleucus*
Northern Scarlet Snake, *Cemophora coccinea copei*

Amphibians

Conservation Targets (Not Grouped)

Longtail Salamander, *Eurycea longicauda longicauda*
Northern Red Salamander, *Pseudotriton ruber ruber*

Conservation Target

Vernal Pond/Pond Breeders

Carpenter Frog, *Lithobates virgatipes*
Eastern Spadefoot, *Scaphiopus holbrookii*
Eastern Tiger Salamander, *Ambystoma tigrinum tigrinum*
NJ Chorus Frog, *Pseudacris kalmi*
Pine Barrens Treefrog, *Hyla andersonii*

Table 1 (Focal SGCN) continued

FISH

Freshwater Fish

Conservation Target (Not Grouped)

Brook Trout, *Salvelinus fontinalis*

Conservation Targets

Pinelands Freshwater Fish

Banded Sunfish, *Enneacanthus obesus*
Blackbanded Sunfish, *Enneacanthus chaetodon*
Mud Sunfish, *Acantharchus pomotis*
Swamp Darter, *Etheostoma fusiforme*

Vulnerable Minnows

Bridle Shiner, *Notropis bifrenatus*
Comely Shiner, *Notropis amoenus*
Ironcolor Shiner, *Notropis chalybaeus*

Marine Fish

Conservation Target

Anadromous and Semi-anadromous Fish

Alewife, *Alosa pseudoharengus*
Atlantic Sturgeon, *Acipenser oxyrinchus*
Blueback Herring, *Alosa aestivalis*
Shortnose Sturgeon, *Acipenser brevirostrum*

INVERTEBRATES (INSECTA)

Bees

Conservation Target

Bumble Bees

American Bumble Bee, *Bombus pensylvanicus*
Ashton Cuckoo Bumble Bee, *Bombus bohemicus*
Rusty Patched Bumble Bee, *Bombus affinis*
Southern Plains Bumble Bee, *Bombus fraternus*
Variable Cuckoo Bumble Bee, *Bombus variabilis*
Yellow Bumble Bee, *Bombus fervidus*
Yellow-banded Bumble Bee, *Bombus terricola*

Moths

Conservation Targets (Not Grouped)

Maritime Sunflower Borer Moth, *Papaipema maritima*
Papaipema harrisii

Conservation Target

Pinelands Moths

A Notodontid Moth, *Heterocampa varia*
Buchholz's Gray, *Hypomecis buchholzaria*
Buchholz's Dart Moth, *Agrotis buchholzi*
Carter's Noctuid Moth, *Spartiniphaga carterae*
Daecke's Pyralid Moth, *Crambus daeckellus*
Pink Sallow, *Psectraglaea carnosa*
Sand Myrtle Looper/Pink, *Cyclophora culicaria*

Tiger Beetles

Conservation Target (Not Grouped)

New Jersey Pine Barrens Tiger Beetle, *Cicindela patruela consentanea*

Conservation Target

Beach Tiger Beetles

Little White Tiger Beetle, *Cicindela lepida*
Northeastern Beach Tiger Beetle, *Cicindela dorsalis dorsalis*
Southeastern Beach Tiger Beetle, *Cicindela dorsalis media*

Butterflies

Conservation Targets (Not Grouped)

Arogos Skipper, *Atrytone arogos arogos*
Dotted Skipper, *Hesperia attalus slossonae*
Frosted Elfin, *Callophrys irus*
Georgia Satyr, *Neonympha helicta*
Hoary Elfin, *Callophrys polios*
Leonard's Skipper, *Hesperia leonardus*
Northern Metalmark, *Calephelis borealis*

Odonates

Conservation Targets (Not Grouped)

Robust Baskettail, *Epitheca spinosa*
Septima's Clubtail, *Gomphus septima*
Superb Jewelwing, *Calopteryx amata*

Conservation Target

Pond Odonates

New England Bluet, *Enallagma laterale*
Pine Barrens Bluet, *Enallagma recurvatum*
Scarlet Bluet, *Enallagma pictum*

INVERTEBRATES (NON INSECTA)

Mussels

Conservation Target

Freshwater Mussels

Brook Floater, *Alasmidonta varicosa*
Dwarf Wedgemussel, *Alasmidonta heterodon*
Eastern Lampmussel, *Lampsilis radiata*
Green Floater, *Lasmigona subviridis*
Triangle Floater, *Alasmidonta undulata*
Yellow Lampmussel, *Lampsilis cariosa*

E. Profiles of the Focal Species of Greatest Conservation Need

Profiles for each of the species that comprise our Focal SGCN have been developed to help users of the plan better understand data known or available concerning these species. Appendix D presents summary information for each individual Focal SGCN, and includes:

- General information on appearance, life history requirements, and geographic distribution within New Jersey;
- State Wildlife Action Plan classification of taxonomic and guild group, and conservation targets;
- Conservation status at the federal, regional, and state levels (including breeding versus nonbreeding for birds), and their ranks within the NatureServe international database;
- Status of the species' population abundance and trend;
- Broad habitat categories;
- Landscape Region(s) where the species occur in New Jersey;
- A statement indicating whether species habitat mapping is available through the New Jersey Landscape Project maps (details on the Landscape Project map are provided in Attachment II); and
- References to additional information on abundance and population trends, as well as other conservation plans that might be available.

This page intentionally left blank

CHAPTER 2: HABITATS of NEW JERSEY

Effective conservation of New Jersey's diverse wildlife requires planning at different scales. At the finer scale, Focal SGCN provide a discrete set of wildlife that are both in need of immediate protection *and* perceived to be responsive to known and feasible conservation actions. Implementing targeted efforts towards their conservation will benefit many other species. But species-specific conservation is not enough, especially given the long-term shifts that are occurring now, and will continue to occur, due to climate change and many other changes to New Jersey's landscape.

I. Mapping SGCN Habitat

New Jersey's Landscape Project mapping (Attachment II) continues to be the principal means by which the DFW documents the locations of habitats that support state listed (Endangered, Threatened, and Special Concern) wildlife species. New Jersey's Landscape Project maps are used by the NJDEP to guide implementation of land use regulations that provide protections to imperiled wildlife species habitats, for internal review of habitat management and other habitat altering projects undertaken by the NJDEP, and as an important factor in land protection efforts overseen by the NJDEP's Green Acres Program. New Jersey's Landscape Project mapping uses the state's land use / land cover GIS data and Biotics species occurrence data to model species habitat locations in the state. The mapping is updated periodically to reflect changes in land use / land cover data mapping and/or updated Biotics species occurrence data. Attachment II provides a more detailed description of New Jersey's Landscape Project habitat mapping methodology and links to online mapping available through the NJDEP's GIS servers.

New Jersey's Landscape Project mapping currently provides presumptive habitat mapping, based upon 2012 LU / LC habitat conditions and 2016 species occurrence data, for more than half (61 of 107) of the Focal Species of Conservation Need identified in this plan (species for which New Jersey's Landscape Project mapping exists are identified in the "Species Profiles" found in Appendix D). This includes habitats in urban areas, provided they meet the standard minimum mapping criteria. In the case of the 46 Focal Species of Conservation Need *not* currently mapped, the "Species Profiles" do provide information on broad habitat categories used by each species, as well as a general map depicting each species range in New Jersey. Together this information can be used to roughly delineate the areas of the state that provide habitat. In the DFW's future development of the Landscape Project mapping consideration will be given to developing and implementing habitat mapping protocols for at least some of the FSGCNs not currently mapped with this methodology.

II. Identifying Conservation Focal Areas

To address broader scale planning needs, the DFW, with input from partners, identified Conservation Focal Areas (CFAs). CFAs are specific areas of New Jersey's geography that feature some of the state's highest value habitats and present important opportunities for effective conservation action. They will allow for the consideration of threats and actions from a geographic perspective so will benefit key wildlife habitats generally and, in turn, virtually all SGCN. Further, CFAs include important opportunities for habitat connectivity, a critical factor

in increasing resilience in a changing landscape. Note that identifying important *urban* wildlife habitats was not a goal of the CFA mapping, and will require a separate, dedicated mapping effort.

With their rich mix of important habitats and diverse species assemblages, CFAs are designed to represent some of the best opportunities for protecting, restoring, and sustaining New Jersey's wildlife diversity.

A. Delineating CFAs

Conservation Focal Areas are intended to reflect a wide variety of habitats throughout New Jersey's landscape regions based upon factors including quality, integrity, connectedness, and the likelihood of successfully implementing conservation actions within them. CFAs were identified using a broad spectrum of conservation-relevant metrics, each related to one of the following broad categories:

- landscape condition/ecological integrity;
- wildlife habitats;
- biological diversity;
- existing conservation infrastructure; and
- negative human influences.

Some metrics helped emphasize riparian corridors that serve to connect larger tracts of habitat in an otherwise fragmented landscape. Other metrics from the recently developed Regional Conservation Opportunity Areas (ROCA) mapping effort helped add a regional perspective to the CFAs in order to address ecosystems of importance not only to New Jersey, but to the Northeast.

The DFW designed the CFA mapping initiative to be separate but complementary to the identification of Focal SGCN. As such, it did not explicitly use information on the distribution of Focal SGCN. However, some species occurrence data layers that included SGCN were used to help identify habitats supporting biodiversity assemblages.

In all, the DFW used more than 40 datasets from state and regional sources with information about habitats within terrestrial, freshwater aquatic, and marine environments to delineate CFAs. Each dataset was weighted relative to its importance, and the DFW then conducted a co-occurrence analysis to identify areas where several different qualities were present. The raw values generated from the weighted co-occurrence analysis were then rescaled at the landscape region level by calculating percentile ranks relative to each region in order to evenly distribute CFAs across the state's six landscape regions. The DFW highlighted places within each landscape region that scored within or greater than the 70^{th} percentile, and then ran a GIS analysis to identify CFA habitats based on key connections between high value areas and protective buffers. Details on selection, weighting, and analysis of CFA data can be found in Appendix E. As a final step, Division staff reviewed the final CFA outputs for each region, and, based on their knowledge of the areas, determined how they could either group or divide the CFA valued habitats in a manner that captured some unique regional, geographic and/or habitat relevance for that area. Staff biologist then assigned a unique Conservation Focal Area name; characterized each in terms of habitat location, scope or scale; predominant habitats and their condition; potential relevance to specific SGCN; and significant threats noted. This resulted in as few as six unique CFAs in several landscape regions, and up to 13 CFAs in the diverse and

highly fragmented Piedmont and Inner Coastal Plain landscape region. Descriptions and mapping for each unique CFA are provided for within each landscape region.

B. Use and Future Development of CFAs

As noted above, the DFW will use CFAs to further identify geographically-based threats to New Jersey's wildlife habitats and develop actions that will address those threats. In addition, the DFW will regularly review and improve CFA maps as new data become available and as new insights are shared by the public and conservation partners. For example, consideration is being given to incorporate established Important Bird Areas identified by Birdlife International and the National Audubon Society, as well as areas that have been mapped as critical migratory bird stopover habitat in the lower Cape May peninsula.

Advancing SGCN conservation at the regional level also remains a priority. To this end, the DFW will continue to work with the North Atlantic Land Conservation Cooperative and the Northeast Association of Fish and Wildlife Agencies to assess how new RCOA mapping products can best be incorporated into future versions of the New Jersey's CFAs.

The Connecting Habitat Across New Jersey (CHANJ) project is another initiative that will contribute to further improvements to CFAs and conservation actions within them, particularly in the context of habitat loss and fragmentation. CHANJ is a multi-partner, multi-disciplinary project led by the DFW that identifies key areas and actions needed to preserve and restore habitat connectivity for terrestrial wildlife at the local, landscape region, and statewide levels. The initiative is designed to help:

- prioritize land protection;
- inform habitat restoration and management; and
- guide mitigation of road impacts on wildlife/habitats.

CHANJ products include a statewide map of core habitat areas and corridors between them, a guidance document, and a road/wildlife toolkit that provides recommendations on protecting, managing, and restoring the functional connectivity within the core habitat areas and corridors.

III. New Jersey's Landscape Regions & Conservation Focal Areas (CFAs)

New Jersey divides into six landscape regions: Atlantic Coast, Delaware Bay, Piedmont/Inner Coastal Plain, Pinelands, Skylands, and Marine (which is exclusively aquatic). The first five landscapes are each characterized by similar landforms, soils, vegetation, and hydrological regimes that collectively support distinctive habitat and species mixes.

Within these landscape regions, the ENSP and its conservation partners have identified Conservation Focal Areas (CFAs). These are the portions of the landscape regions that are of particular conservation interest because they have important habitats and species assemblages, and represent the best opportunities for protecting, restoring, and sustaining the state's wildlife diversity. They also include important opportunities for habitat connectivity, a critical factor in increasing resilience in a changing landscape. The CFAs were delineated as described above and in Appendix E using available data and expert knowledge of wildlife and their habitats. Figure 2

depicts a map of New Jersey's six landscape regions, as well as the CFA habitats delineated therein.

While research is underway to assess the condition of habitats within state lands, the sheer extent of Conservation Focal Areas precludes detailed assessments of the conditions of the many different wildlife habitats within them. Lacking such an assessment, the ENSP has described the habitats of the CFAs based on an evaluation of 18 land-use and land-cover based habitat categorizations (see Appendix F for a habitat characterization crosswalk) and the knowledge and experience of NJDEP staff.

In the following sections, we briefly describe each of the landscape regions and the CFAs within them. For each CFA, we note its location, important habitats, and the condition of these habitats.

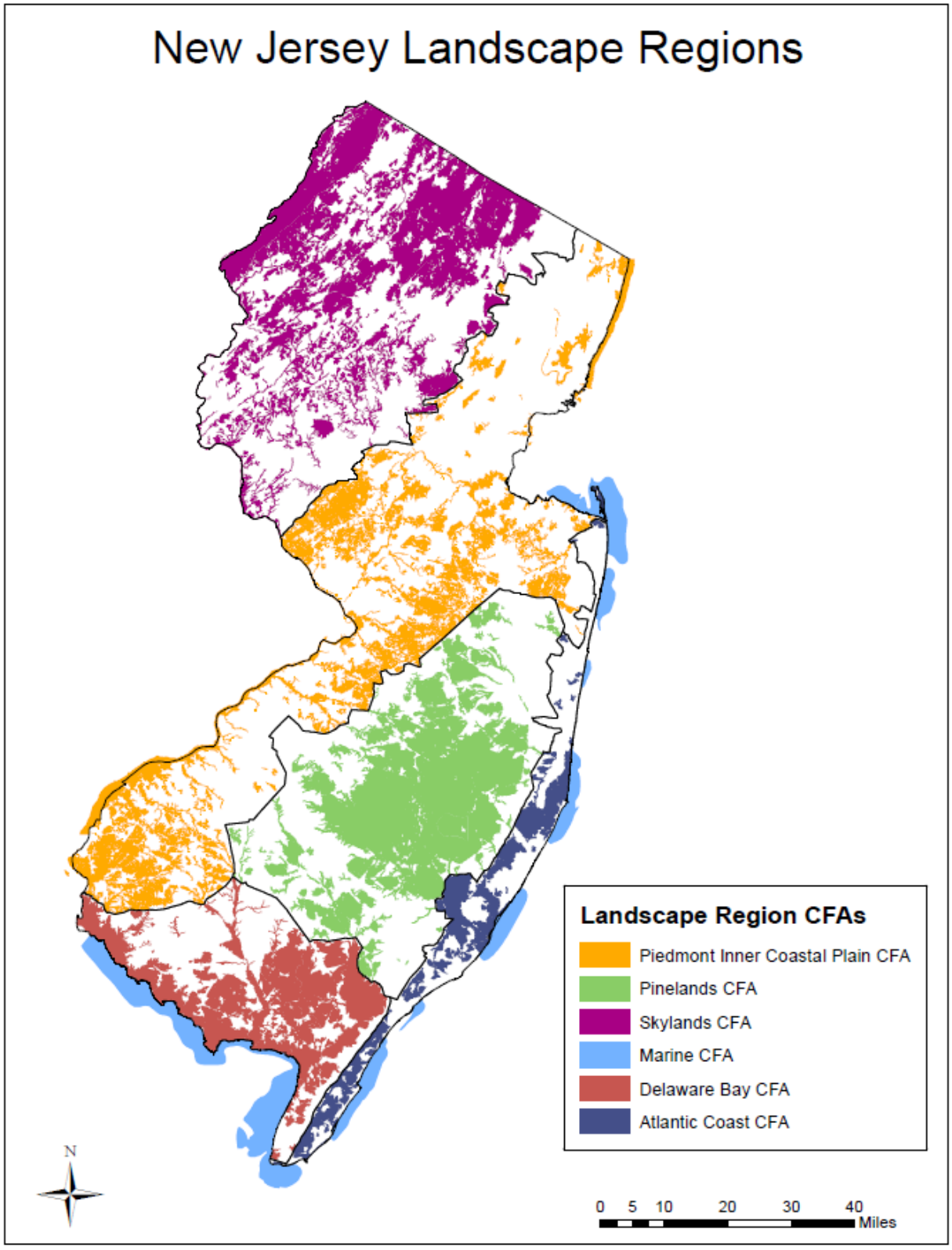


Figure 2. Statewide mapping of Conservation Focal Areas, by Landscape Region.

Atlantic Coast Landscape Region and Its CFAs

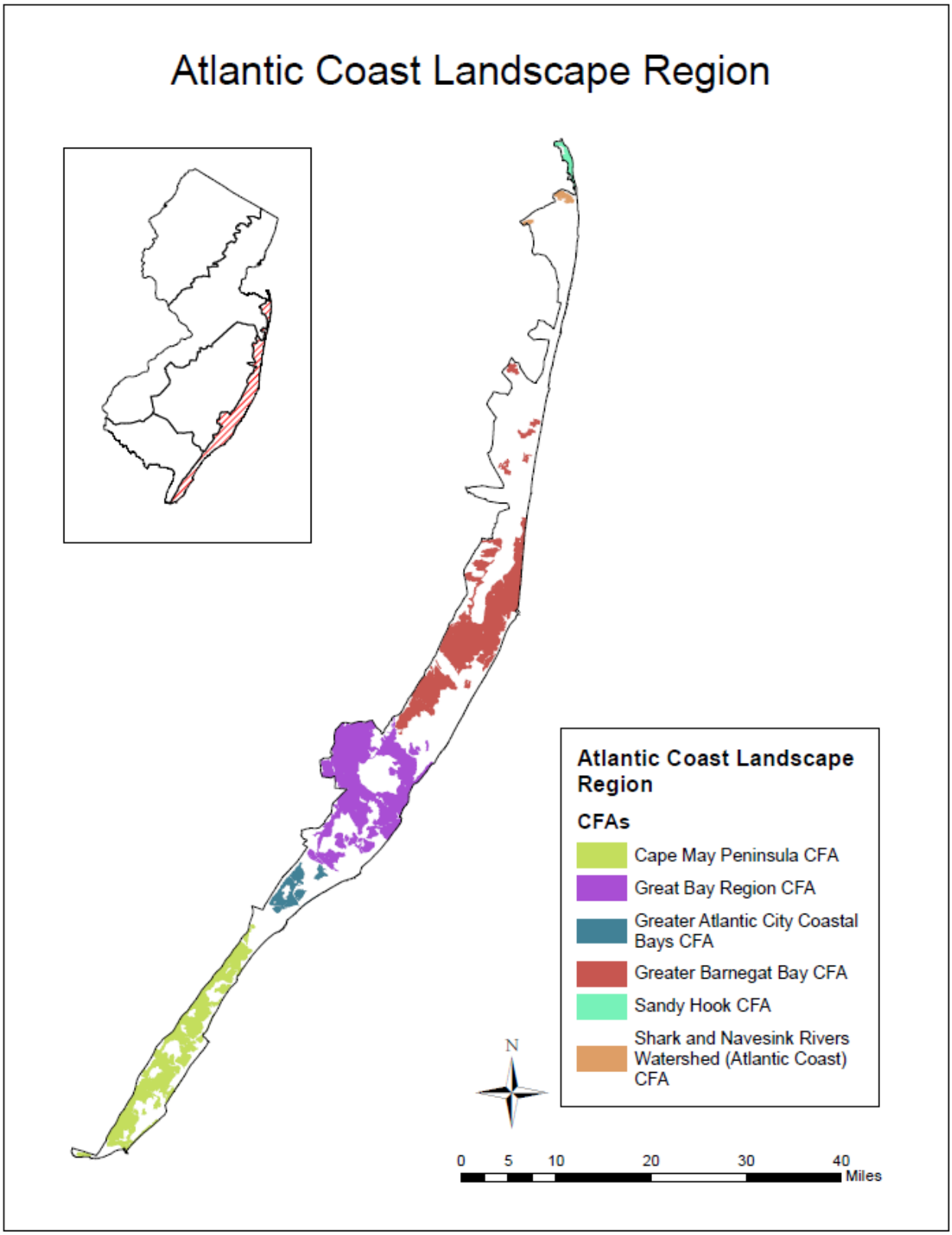


Figure 3. Mapping of Atlantic Coast Landscape Region CFAs.

This landscape region encompasses parts of Monmouth, Ocean, Cape May, and Atlantic counties and consists of barrier islands and beaches, tidal salt marshes, rivers, shallow bays, and lagoons along New Jersey's coastline (Figure 3). New Jersey's Atlantic coast beaches and marshes are among the most productive coastal habitats in the country. That said, the region also includes extensively degraded locales with few natural areas.

Threats to the region's habitats are led by development that impairs the ability of the coastal system to function normally. Upland portions of the barrier islands are almost entirely developed, and to protect these areas, the islands have been stabilized through extensive use of groins, seawalls, jetties, and intense beach replenishment programs. These engineering efforts preclude the normal, dynamic functions of coastal systems and thereby reduce the suitability of habitats for wildlife. Their effects are intensified by sea level rise and marsh subsidence, both of which have affected and will continue to impact the marshes and barrier islands.

A. Sandy Hook CFA

This CFA is composed of habitat within the Gateway National Recreation Area, Sandy Hook Unit which is National Park Service property. Although the park is heavily used for recreation, there are portions of it that remain highly suitable for wildlife. As a largely undeveloped barrier island, it offers some of the most mature maritime forest habitat left in the state. It plays an important role for endangered wildlife species, such as piping plover (where in some years more than half the state's population resides) as well as endangered plant species such as sea-beach amaranth. The habitat provides excellent stopover habitat for migrating passerines and shorebirds as evidenced by its designation as a globally significant Important Bird Area.

Although Sandy Hook receives some of the most intense recreational use in the state, the habitats in this CFA are generally intact, which leads to both greater quality and more availability than the fragmented beaches and marshes found elsewhere in the coastal zone. Its wide diversity of habitats (including beaches, secondary dunes, maritime forests, and bayside shoreline) provides important opportunities for wildlife in the northern portion of New Jersey's coast.

This CFA encompasses 0.5% of the Atlantic Coast Landscape Region at 605 hectares, including approximately 602 hectares of terrestrial and wetland habitats and 3 hectares of aquatic habitats. Approximately 500 hectares, or 83% of the CFA, are classified as federal, state, or county open space. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

B. Greater Barnegat Bay CFA

This CFA includes lands around the Manasquan River, Barnegat Bay, Manahawkin Bay, and Little Egg Harbor Bay. Island Beach State Park, one of the longest expanses of undeveloped barrier islands in the state, is an important stopover habitat for migrating passerines. The marsh and bay habitats in this CFA provide some of the most important areas for nesting ospreys, terns, and gulls, and many aquatic species use this area for early life stages. The bay habitats also hold the majority of the state's eelgrass beds, which provide vitally important

fish nursery habitat. Important Bird Areas of state significance are designated within this CFA.

Similar to the Sandy Hook CFA, the habitats in this CFA experience intensive recreational use, but there is less development than elsewhere along the Atlantic coast. Because of this, the CFA's habitats (including marsh islands, maritime forests, and beaches) are still highly suitable for wildlife.

This CFA encompasses 14% of the Atlantic Coast Landscape Region at 18,103 hectares, including approximately 10,166 hectares of terrestrial and wetland habitats and 7,937 hectares of aquatic habitats. Approximately 6,976 hectares, or 39% of the CFA, are classified as federal, state, or county open space. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

C. Great Bay Region CFA

This CFA is dominated by the most critical coastal habitat remaining in the state, most of which is owned by the NJ Division of Fish & Wildlife or the U.S. Fish & Wildlife Service. Unlike other CFAs in the coastal landscape, the habitats here are both largely undeveloped and subject to stricter regulations regarding human disturbance. A large portion of the CFA falls within the Edwin B. Forsythe National Wildlife Refuge, some of which is designated Wilderness Area. This protection has allowed the area to flourish under primarily nature-based forces (versus the human generated stabilization efforts that are commonplace elsewhere along the coast). Holgate, Little Beach, and North Brigantine Natural Areas compose a trifecta of exemplary habitats for barrier island species such as piping plovers, least terns, and diamondback terrapins. The marsh islands in this CFA provide nesting habitat for long-legged wading birds, ospreys, terns, skimmers, and gulls. Migratory shorebirds find refuge on the beaches and marsh mudflats during both spring and fall migrations. In addition to having multiple state-significant Important Bird Areas, one in the Mullica River Corridor is continentally significant while another in Holgate is globally significant.

This CFA contains the best coastal habitats in the Atlantic Coast Landscape Region. Its undeveloped barrier islands and extensive marsh islands provide some of the most expansive natural areas left on New Jersey's coast.

This CFA encompasses 15% of the Atlantic Coast Landscape Region at 19,203 hectares, including approximately 14,113 hectares of terrestrial and wetland habitats and 5,091 hectares of aquatic habitats. Approximately 13,923 hectares, or 73% of the CFA, are classified as federal, state, or county open space. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

D. Greater Atlantic City Coastal Bays CFA

The habitats in this CFA are characterized by a transition from northern areas (which are dominated by open water dotted with small islands) to southern areas in which large expanses of marsh divide the open water into smaller bodies. It includes habitats from the lands around Lakes Bay, Shelter Island Bay, Scull Island, Great Egg Bay, and Pecks Bay.

This CFA contains some of the most developed coastline in the state and counts Atlantic City, Ventnor, and Ocean City among the municipalities within its boundaries. Nonetheless, long-standing and important habitats exist – primarily on the marsh islands – for long-legged wading birds, ospreys, terns, and skimmers. It also includes some beachfront areas that provide habitat for species like piping plover and American oystercatcher, though these areas are under heavy pressure from human development and disturbance.

The habitat conditions of this CFA are poorer than other CFAs in the Atlantic Coast Landscape Region due to extensive development and modifications (such as extensive ditching of the marshes). That said, some intact habitats do exist in the CFA, especially on smaller marsh islands (which were not ditched) where species concentrate.

This CFA encompasses 2% of the Atlantic Coast Landscape Region at 2,355 hectares, including approximately 1,843 hectares of terrestrial and wetland habitats and 512 hectares of aquatic habitats. Approximately 587 hectares, or 25% of the CFA, are classified as federal, state, or county open space. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

E. Cape May Peninsula CFA

The habitats in this CFA are similar to the Greater Atlantic Coastal Bays CFA in that there are wide expanses of marsh with smaller areas of open water in the back bays (although much of these habitats have been ditched and now provide limited benefit to wildlife). However, the scale of development is slightly less and the area features inlet systems that are either not stabilized with jetties (notably Corson's and Hereford Inlets) or are adjacent to habitat largely protected by federal agencies (particularly the Cape May Inlet). These unestablished inlets are the foundation for the most suitable habitat that occurs in the coastal landscape for beach nesting birds and migratory shorebirds. The area's proximity to Delaware Bay further enhances its importance to migratory shorebirds and long-legged wading birds, as they are known to cross the landmass to use both coastal sides of the peninsula. In addition, the funneling effect of the peninsula means that migratory bird species of many genera (including those in the waterbird, passerine, and raptor groups) utilize the area for migratory and stopover purposes.

The habitats in this CFA are, on the whole, in better condition than most of the areas in the Atlantic Coast Landscape Region though not as good as those in other CFAs, such as in the Great Bay Region CFA. The larger bays allow for increased isolation of the marsh islands, which decreases the effects of human disturbance and development, and its geographical positioning makes it particularly important for coastal wildlife. However, intense human development has reduced it from functioning at peak potential.

This CFA encompasses 10% of the Atlantic Coast Landscape Region at 12,875 hectares, including approximately 10,026 hectares of terrestrial and wetland habitats and 2,849 hectares of aquatic habitats. Approximately 8,002 hectares, or 62% of the CFA, are classified as federal, state, or county open space. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

F. Shark and Navesink Rivers Watershed (Atlantic Coast) CFA

This CFA area includes lower portions of the Navesink River watershed, including Monmouth County's Hartshorne Woods Park. While this CFA has been mapped within the Atlantic Coast Landscape Region, it is functionally equivalent to, and an appendix of, the Piedmont/Inner Coastal Plain Landscape Region's Shark and Navesink Rivers Watershed (Piedmont and Inner Coastal Plain) CFA. Please refer to that section for a description of the CFA's habitat types, conditions, and values.

This CFA encompasses 0.4% of the Atlantic Coast Landscape Region at 467 hectares, including approximately 358 hectares of terrestrial and wetland habitats and 109 hectares of aquatic habitats. Approximately 302 hectares, or 65% of the CFA, are classified as federal, state, or county open space. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

Delaware Bay Landscape Region and Its CFAs

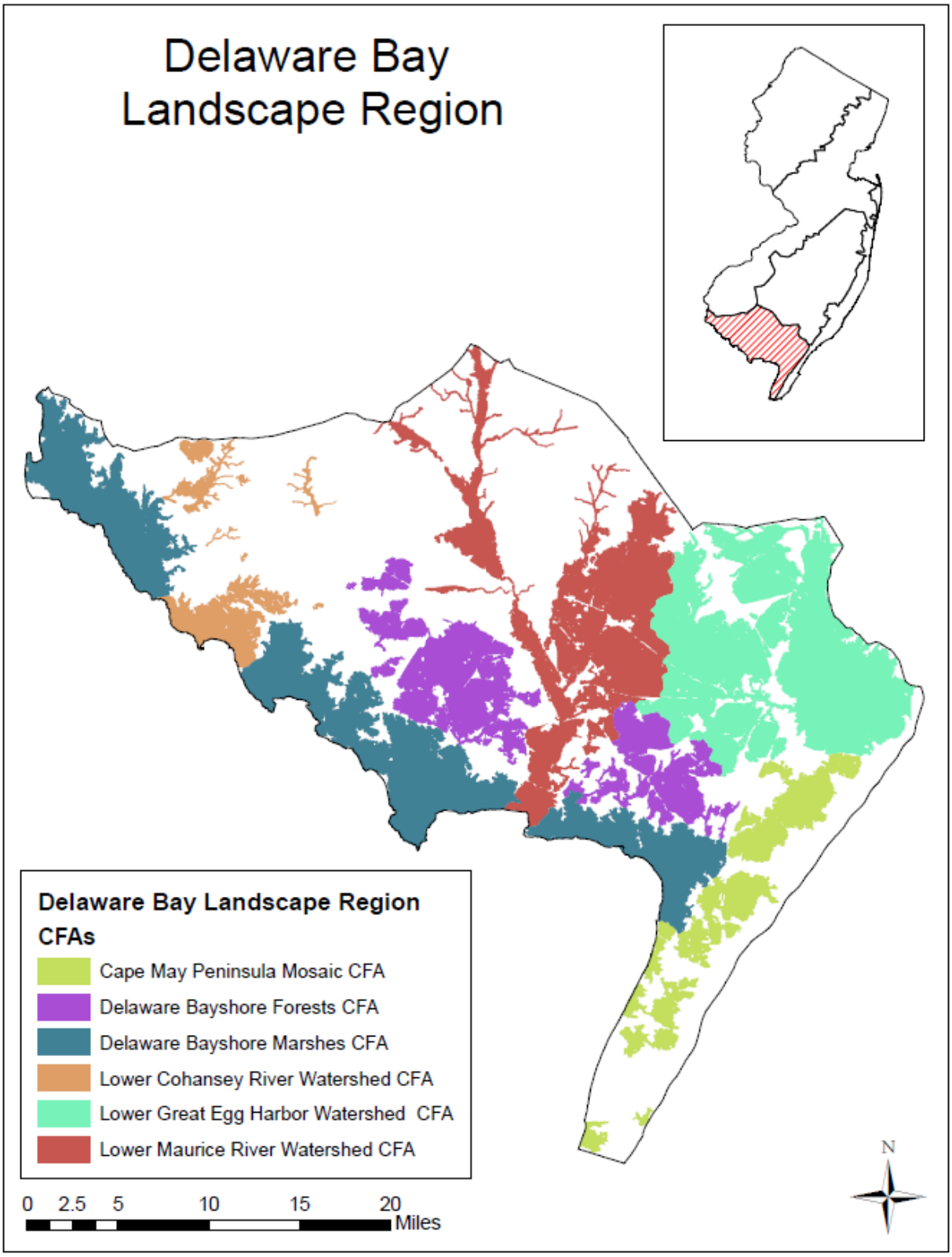


Figure 4. Mapping of Delaware Bay Landscape Region CFAs.

This landscape region encompasses all or parts of Cape May, Atlantic, and Cumberland counties (Figure 4). The region still contains vast woodland tracts that are among the largest in the state and are critical to migratory neotropical birds and raptors. The region's expansive habitat mosaic of rivers and streams flowing into the tidal Delaware Bay supports concentrations of rare wildlife and wintering waterfowl. Extensive salt marsh and sandy overwash beaches support a significant horseshoe crab breeding area and important stopover areas for migrating shorebirds, including the red knot, a federally threatened species of worldwide significance.

These important habitats remain in good condition for most species and the Cape May Peninsula remains one of the country's most important migratory stopovers for hundreds of bird and insect species. That said, the region is vulnerable. All of the region's habitats are threatened by development that fragments natural landscapes and invasive species that outcompete native species. The loss of peninsula habitat is a particular threat to migratory birds and to other species that reside permanently in this limited area. The vast tidal marshes of Delaware Bay are vulnerable to sea level rise and shoreline erosion, as are interior wetlands that could be affected by storm surge. Natural subsidence of marshes and alteration for salt hay farms could continue to significantly reduce high salt marsh habitat which is important for species like black rail and northern harrier. Inappropriate silvicultural practices could also degrade the habitat value of forests for many interior-dependent forest wildlife species.

A. Cape May Peninsula Mosaic CFA

The Cape May Peninsula Mosaic CFA extends the length of Cape May from the western portion of peninsula up to the north and northwestern boundaries of the Cape May National Wildlife Refuge. It is bounded on the west by the Delaware Bay shoreline between Cape May Canal and Bidwell Creek. The CFA's habitats are mostly forest, but include shrub, field, and marsh edge. This CFA is particularly important for southbound migratory birds that are funneled into it by prevailing winds. It also supports the majority of the state's eastern tiger salamander and southern gray treefrog populations.

Habitats on the peninsula are quite fragmented by development and roads, although blocks of land are conserved under state and federal ownership. Many habitats are impaired by invasive plant species that have crowded out native food and cover plants. Saltwater intrusion has also caused some of the forest edge to die off, affecting Atlantic white cedar and mixed forest types. Conversion of habitat to development threatens the viability of the peninsula as a migratory bird stopover, making beneficial management of remaining parcels important.

This CFA encompasses 4% of the Delaware Bay Landscape Region at 10,393 hectares, including approximately 10,097 hectares of terrestrial and wetland habitats and 296 hectares of aquatic habitats. Approximately 5,075 hectares, or 49% of the CFA, are classified as federal, state, or county open space. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

B. Delaware Bayshore Marshes CFA

The Delaware Bayshore Marshes CFA's southern boundary is Bidwell Creek, north of which it extends north and west to the Delaware Bay Landscape Region's northwestern edge. This

CFA includes several disjunct sections, broken at the mouth of the Cohansey River to recognize the contiguous Cohansey River delta and Lower Cohansey River Watershed CFA's characteristic agricultural-woodland-marsh delta. It is also interrupted to recognize the contiguous Maurice River from its mouth to its upper reaches in the Maurice River Watershed CFA. The Delaware Bayshore Marshes CFA consists primarily of a mixture of low salt marshes and high salt marshes with mudflats and muddy tidal creek shores that are significant for breeding and wintering bald eagles, northern harriers, ospreys, and nesting and wintering waterfowl.

In general, the habitat condition is good, but this system is still recovering from decades of alteration for salt hay production. Formerly impounded salt marshes exhibit land subsidence that can make the marsh more vulnerable to sea level rise. The combination of past human activities, storm effects, and eroding shorelines have resulted in high salt marshes becoming low salt marshes, and the system is vulnerable to accelerated tidal flooding.

This CFA encompasses 13% of the Delaware Bay Landscape Region at 30,267 hectares, including approximately 25,736 hectares of terrestrial and wetland habitats and 4,531 hectares of aquatic habitats. Approximately 17,951 hectares, or 59% of the CFA, are classified as federal, state, or county open space. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

C. Delaware Bayshore Forests CFA

The Delaware Bayshore Forests CFA includes the many tracts of wetlands and upland forests that are immediately inland of the Delaware Bayshore Marshes CFA. This CFA is disjunct, interrupted by the Maurice River Watershed CFA, and contains a significant amount of protected land and some of the largest contiguous forest tracts outside of the Pinelands. These forests are the stronghold for many forest-dependent species, including barred owls and red-shouldered hawks.

In general, the condition of forests in this CFA is good, providing a mixture of forest ages and structure, and a variety of types, from Atlantic white cedar and red maple wetlands to mixed pine-hardwood uplands. Forest management has been very limited, and the primary silviculture focus has been reacting to forest pests like gypsy moth (in the 1990s) and southern pine beetle (in the 2000s). In addition, saltwater intrusion has caused some of the forest edge to die off, affecting Atlantic white cedar and mixed forest types. Fragmentation is a threat to this CFA's important core forests, but to a lesser degree than in some other CFAs.

This CFA encompasses 7% of the Delaware Bay Landscape Region at 16,986 hectares, including approximately 16,325 hectares of terrestrial and wetland habitats and 661 hectares of aquatic habitats. Approximately 11,208 hectares, or 66% of the CFA, are classified as federal, state, or county open space. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

D. Lower Great Egg Harbor Watershed CFA

The Lower Great Egg Harbor Watershed CFA is within the harbor's watershed boundary except for the southern portion, where the Cape May National Wildlife Refuge is part of the Cape May Peninsula Mosaic CFA. This CFA is a mixture of tidal rivers and forests along the tributaries of the Great Egg Harbor, Middle, and Tuckahoe rivers. Beyond the marshes and marsh-forest boundaries, the woodlands are mostly fragmented with the exception of those on state lands. These habitats are significant for breeding and wintering bald eagles, ospreys, and nesting and migrating landbirds and waterbirds.

While the forests in this area are very fragmented, the overarching mosaic of woodlands, marshes, and tidal waterways is a generally healthy system. Water quality is good (the Great Egg Harbor River is a National Wild and Scenic River), but the salt marshes reflect a high degree of grid-ditching as a result of mosquito control activities in the 1950s. Low salt marsh dominates this system, and the limited remaining areas of high salt marsh are threatened by sea level rise and marsh subsidence.

This CFA encompasses 12% of the Delaware Bay Landscape Region at 29,210 hectares, including approximately 26,985 hectares of terrestrial and wetland habitats and 2,225 hectares of aquatic habitats. Approximately 18,682 hectares, or 64% of the CFA, are classified as federal, state, or county open space. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

E. Lower Maurice River Watershed CFA

The Lower Maurice River Watershed CFA includes the Maurice River from most of the upper headwaters in northern Cumberland County, the Menantico and Manumuskin tributary rivers, and the Maurice itself. This CFA interrupts the Delaware Bayshore Marshes CFA to recognize the importance of the continuous Maurice River from bay to headwaters. It is characterized by the tidal and brackish waters of multiple tributaries, wide adjacent marshes, and woodlands. It is significant for breeding and wintering bald eagles, nesting ospreys, nesting and wintering waterfowl and waterbirds, and fish populations that support a wide variety of wildlife.

The Maurice River below Willow Grove Lake has excellent water quality (which helped it gain National Scenic and Recreational River status). Wetland habitats are dominated by Phragmites mainly in the brackish portion near Mauricetown. Woodlands along the river are generally in good condition, though fragmented intermittently by development (associated with towns of Millville and Laurel Lake) and pockets of sand mining.

Other portions of the upper watershed are mapped as CFAs within the Pinelands Landscape Region's Upper Maurice River Watershed (Pinelands) and the Piedmont/Inner Coastal Plain Landscape Regions' Upper Maurice River Watershed (Piedmont/Inner Coastal Plain). These CFAs share many similarities with the Lower Maurice River Watershed CFA.

This CFA encompasses 10% of the Delaware Bay Landscape Region at 22,750 hectares, including approximately 20,449 hectares of terrestrial and wetland habitats and 2,301 hectares of aquatic habitats. Approximately 14,171 hectares, or 62% of the CFA, are

classified as federal, state, or county open space. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

F. Lower Cohansey River Watershed CFA

The Lower Cohansey River Watershed CFA is bounded by the Maurice River watershed to the east, and the boundary around the river's mouth near Bayshore is defined by local roads running from the uplands and bisecting the marsh. The Cohansey River is characterized by the wide tidal estuary and an adjacent marsh-woodlot-agricultural habitat matrix that is exceptional habitat for nesting and wintering bald eagles, northern harriers, ospreys, waterbirds, and wintering waterfowl. Disjunct from the lower river, the CFA includes upper watershed streams that are the Cohansey's headwaters.

The habitats in the lower Cohansey River are shaped by agricultural use that has reduced structural diversity and degraded water quality. Agriculture dominates both the upper and lower portions of the watershed, covering 60% to 70% of the landscape. As a result, water quality is compromised with elevated phosphorus, bacteria, and high turbidity. Structurally, the marsh-upland ecotone is limited to a narrow woodland separating marshes from planted fields in most of the river below Bridgeton. Phragmites is found in pockets, especially upstream toward Bridgeton.

This CFA encompasses 2% of the Delaware Bay Landscape Region at 5,717 hectares, including approximately 4,934 hectares of terrestrial and wetland habitats and 783 hectares of aquatic habitats. Approximately 1,923 hectares, or 34% of the CFA, are classified as federal, state, or county open space. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

Piedmont and Inner Coastal Plain Landscape Region and Its CFAs

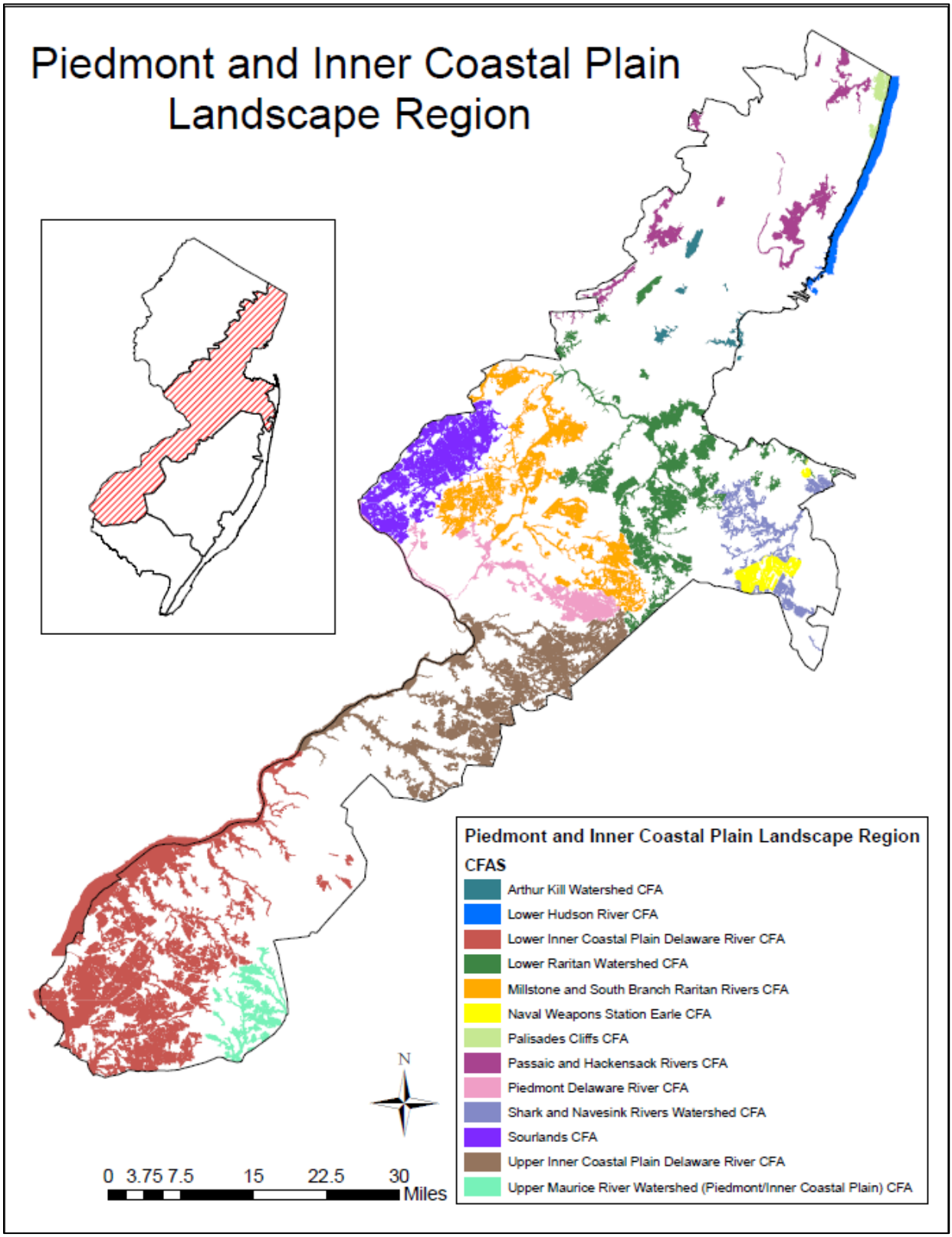


Figure 5. Piedmont and Inner Coastal Plain Landscape Region CFAs.

This landscape region combines two of New Jersey's physiographic regions, the Piedmont and the Inner Coastal Plain. It encompasses all or parts of Burlington, Gloucester, Salem, Mercer, Middlesex, Monmouth, Hunterdon, Somerset, Union, Essex, Hudson, Passaic, and Bergen counties (Figure 5). It is a network of waterways drained by the Delaware and Raritan Rivers and is characterized by farmed areas, extensive grasslands, fragmented woodlands, and some of the world's most productive tidal freshwater marshes.

The conditions of the region's habitats vary, but all have been influenced by human settlement as most of this region has been logged, farmed, and developed. Because habitat values were assessed by percentile rank *within a landscape region* as opposed to being ranked statewide (see Appendix E), CFA mapping in the Piedmont and Inner Coastal Plain region captured more anthropogenically influenced wildlife habitats than did other regions. While this "best of the region" approach ensured that CFA mapping captured habitats in this region that might have been overshadowed if compared on a statewide scale, it should be noted that there was no attempt to capture truly "urban" wildlife habitats. Threats today and in the future include invasive species, continued development, and over-browsing by white-tailed deer. Sea level rise may also impact the freshwater tidal marshes as the saltwater moves farther up into the freshwater tidal areas of the Delaware, Raritan, and Hudson Rivers and their tributaries.

A. Arthur Kill Watershed CFA

This CFA consists of five distinct locations within the Arthur Kill Watershed. The CFA includes streams, lakes, tidal rivers, and their associated wetlands and forests. Each location is relatively unfragmented by development but separated from each other by at least two miles of developed lands. Three of the areas are a part of an Important Bird Area that is known to be habitat for breeding populations of many endangered and threatened bird species, and significant congregations of breeding wading birds, and wintering waterfowl. The majority of this CFA consists of parcels owned by Union, Essex, and Middlesex counties.

Habitat quality in this CFA is generally poor. The streams are moderately to severely impaired and have poor habitat quality. Phragmites is encroaching on the CFA's tidal marshes, which are further contaminated with mercury, sewage, and other pollutants. Very little high salt marsh habitat remains in this CFA because of Phragmites, development, and sea level rise. A few areas, such as South Mountain, have large enough mosaics of upland and wetland forests to buffer some of the effects of fragmentation from the surrounding roads and development, but they are isolated from one another.

This CFA encompasses 0.3% of the Piedmont and Inner Coastal Plain Landscape Region at 1,729 hectares, including approximately 1,339 hectares of terrestrial and wetland habitats and 390 hectares of aquatic habitats. Approximately 1,021 hectares, or 59% of the CFA is classified as federal, state, or county open space. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

B. Naval Weapons Station Earle CFA

The entire CFA is a U.S. Navy base that houses ammunition and explosives. It is mostly composed of wetlands and upland forests with scattered clearings and roads, and it contains some of the headwaters for the Manasquan, Navesink, and Shark Rivers.

This CFA contains large patches of deciduous wooded wetlands and upland coniferous/mixed forests, which serve as a relatively unfragmented forested oasis in an area surrounded by development and some agriculture. Forested areas near the roads, depots, and rights-of-way are affected by fragmentation. This relatively pristine CFA borders the northern edge of the Pinelands Landscape Region, contains high-quality acid waters, and is the only location in the Piedmont and Inner Coastal Plain Landscape Region that contains habitat for the Pine Barrens bluet.

This CFA encompasses 1% of the Piedmont and Inner Coastal Plain Landscape Region at 3,447 hectares, including approximately 3,428 hectares of terrestrial and wetland habitats and 20 hectares of aquatic habitats. None of the CFA is classified as federal, state, or county open space. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

C. Lower Hudson River CFA

This CFA consists of the Hudson River from the New York state line down to Jersey City. It is a tidal estuary consisting almost entirely of brackish water that is crossed by the Tappan Zee and George Washington Bridges, the Lincoln and Holland Tunnels, and the PATH and Pennsylvania railroads. The estuary is heavily traveled by ferries and boats, including barges. With the exception of the Palisades CFA, the Lower Hudson River CFA is isolated from other natural habitats as it is bounded on the east and west by heavy development. That said, the Hudson River serves as a critical corridor for anadromous fish, including Atlantic sturgeon, traveling to spawning grounds upstream.

Runoff from impervious surfaces and sewage overflows are now the main sources of pollution on this stretch of the Hudson River, though it is still contaminated with mercury, PCBs, and other pollutants from activities that occurred decades ago. However, the water quality of the Hudson River has improved, particularly in the northern part of the CFA, and supports aquatic flora and fauna as well as the terrestrial wildlife that depend on it as a food source.

This CFA encompasses 0.3% of the Piedmont and Inner Coastal Plain Landscape Region at 5,276 hectares, including approximately 102 hectares of terrestrial and wetland habitats and 5,174 hectares of aquatic habitats. Approximately 361 hectares, or 7% of the CFA, are classified as federal, state, or county open space. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

D. Lower Inner Coastal Plain Delaware River CFA

This CFA consists of riparian networks of streams and rivers and their associated tidal and fresh wetlands, forests, and farms, which drain into the Delaware River. It includes the Alloway/Hope Creek Watershed at the southern end of the Piedmont and Inner Coastal Plain

Landscape Region north to the Cooper River Watershed. The majority of this CFA is tidal marsh along the Delaware River with an agriculture matrix farther east and a developed matrix farther north. This CFA is also part of eight Important Bird Areas that collectively support breeding bald eagles, northern harriers, marshbirds of regional priority, and an exceptional diversity of breeding landbirds.

This CFA is distinct because it contains the tidal portion of Delaware River, brackish water, and a mixture of salt and freshwater tidal marshes. Towards the northern boundary of this CFA, which is just south of Pennsauken Creek in Camden, water quality is severely impaired as development and impervious surfaces encroach on the small slivers of forest and shrubs that border the tributaries. The lack of vegetated buffer between development and the stream results in higher water temperatures and pollutants from runoff, resulting in degraded water quality. Further, dams and road crossings in some areas serve as pinch points for tidal flow, depriving many upriver marshes of sediments and nutrients, and also keeping out natural flooding during tidal extremes. Farther downstream along the Delaware River, water quality is moderately impaired as the matrix of development is broken up by large patches of agricultural lands, resulting in higher quality habitat overall. Depending on what is being grown, these areas can attract many area-sensitive species that need grasslands to breed, but they can also contribute to nutrient loading of streams from runoff.

This CFA encompasses 8% of the Piedmont and Inner Coastal Plain Landscape Region at 56,570 hectares, including approximately 42,679 hectares of terrestrial and wetland habitats and 13,891 hectares of aquatic habitats. Approximately 5,155 hectares, or 9% of the CFA, are classified as federal, state, or county open space. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

E. Lower Raritan Watershed CFA

This CFA is an interconnected riparian network of streams and rivers and their associated freshwater wetlands, low salt marshes, forests, and farms. It follows the boundary of Union and Somerset Counties south through the center of Middlesex County into northern Monmouth County. Large patches of upland and wetland forests mixed with development surround most of the headwaters in the southern portion of this CFA. The headwaters in the northern portion of the CFA occur on the southeastern portion of First and Second Watchung Mountain, which support some small but intact patches of upland forest surrounded by many residential areas. Two small, isolated forests also occur in Middletown Township. Some of the salt marshes in northern Monmouth County are part of the large Raritan Bay Important Bird Area, known for breeding black skimmers, wading birds, and salt marsh/wetland birds of regional priority as well as a significant congregation of wintering waterfowl, particularly greater scaup. The majority of this CFA is owned by federal, state, county, and municipal governments, and also nonprofit organizations.

The salt marshes near the mouth of the Raritan River and tributaries to the north are riddled with Phragmites and surrounded by development and impervious surfaces, creating low quality habitats contaminated by runoff. A few patches of freshwater tidal marshes that are not overrun with Phragmites can be found farther upstream, but their water quality is still moderately to severely impaired. Isolated forest patches are large enough to buffer

fragmentation effects from surrounding development, but they contain many invasive plant species and an overabundant deer population that keeps understory vegetation from growing, leaving forested habitats of generally fair quality.

This CFA encompasses 3% of the Piedmont and Inner Coastal Plain Landscape Region at 21,257 hectares, including approximately 19,197 hectares of terrestrial and wetland habitats and 2,061 hectares of aquatic habitats. Approximately 7,428 hectares, or 35% of the CFA, are classified as federal, state, or county open space. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

F. Millstone and South Branch Raritan Rivers CFA

This CFA is an interconnected riparian network of streams and rivers and their associated wetlands, forests, and farms set within a matrix of development. It spans across most of Somerset County and follows the border of Mercer and Middlesex Counties into northern Monmouth County. Many of the brooks in this CFA are a stronghold for several rare minnow species and currently do not contain any non-native fish species. This CFA also is a part of three Important Bird Areas that are known for breeding bald eagles, kestrels, endangered and threatened grassland birds, and a plethora of forest and shrub birds of regional priority. The CFA also has a significant stopover site for migrating landbirds in both the spring and fall, and significant congregations of wintering waterfowl and fall migrating raptors. The Millstone River and the Delaware & Raritan Canal are mostly owned by the state, serve as continuous corridors connecting the northern and southern ends of this CFA, and are central to the importance of this area.

Although the waterways in this CFA are extremely important for rare freshwater fishes, water quality along the Millstone River and its tributaries is impaired and considered to be of poor to moderate quality due to nutrient and/or bacteria loads, sedimentation, and runoff due to the increasing presence of impervious cover as farms and forests along the waterways are converted into developments. Patches of forest, agriculture, and grasslands occur at the headwaters, but they are heavily fragmented by development. Overabundant deer and invasive plants keep the diversity of shrubs at a minimum. Few patches of forest within this CFA are large enough to buffer the effects of fragmentation from the surrounding development and agriculture, resulting in poor to low quality of wildlife habitats.

This CFA encompasses 3% of the Piedmont and Inner Coastal Plain Landscape Region at 21,647 hectares, including approximately 20,746 hectares of terrestrial and wetland habitats and 900 hectares of aquatic habitats. Approximately 6,942 hectares, or 32% of the CFA, are classified as federal, state, or county open space. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

G. Palisades Cliffs CFA

This CFA consists of one contiguous patch of forest and cliffs bordered on the east by the Hudson River and New York City, and on the west by a heavily developed portion of Bergen County. The cliffs are home to the last known New Jersey population of the endangered Allegheny woodrat as well as natural cliff-nesting peregrine falcons. The forests at these cliffs are also an Important Bird Area that serves as a significant fall migratory stopover for

raptors and landbirds. Most of this CFA is owned by the county or the Palisades Interstate Park Commission.

This CFA is a forested and rocky haven with excellent water quality in an otherwise heavily urbanized area, though it is far from pristine. The habitat is generally of fair quality as the forest patches are narrow, separated from other forest patches by the Palisades Parkway and development, and riddled with many different invasive and exotic plant species.

This CFA encompasses 0.2% of the Piedmont and Inner Coastal Plain Landscape Region at 1,403 hectares, including approximately 1,397 hectares of terrestrial and wetland habitats and 5 hectares of aquatic habitats. Approximately 1,313 hectares, or 94% of the CFA, are classified as federal, state, or county open space. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

H. Passaic and Hackensack Rivers CFA

This CFA consists of seven distinct locations containing streams, lakes, and tidal rivers that are a part of or drain into the Passaic and Hackensack Rivers and their associated wetlands and forests. Each location is relatively unfragmented by development, but is separated from others by at least 1.5 miles of developed lands. Two of the areas are a part of three Important Bird Areas that have known breeding habitats for many endangered, threatened, and regional priority bird species, as well as significant congregations of breeding wading birds, wintering waterfowl, spring and fall migrating landbirds, fall migrating waterfowl, gulls, and terns. Almost the entire CFA is owned by a variety of government bodies and nonprofits.

The largest part of this CFA is the Hackensack Meadowlands and the tidal waters and low salt marshes downstream. Much of this is poor quality habitat, contaminated with high levels of mercury, dominated by Phragmites, and surrounded by highways, development, and landfills. The Meadowlands has a history of degradation and contamination. A significant recovery has been made, as evidenced by water quality testing showing improved dissolved oxygen levels, among other metrics. Improvement in habitat conditions has also been documented via the long-term monitoring of biota. Approximately 800 acres in the Meadowlands have been significantly enhanced to provide better quality wetland habitat to a diverse and sustained plant and wildlife community. Some remnant areas with desirable wetland vegetation still exist here. Hundreds of acres of tidally exposed mudflat is inhabited by a valuable benthic invertebrate community that supports many thousands of waterfowl, shorebirds, and wading birds. Populations of iconic wetland species, including bald eagle, osprey, and diamondback terrapin, continue to grow in the Meadowlands.

A forested part of this CFA - occurring on and around the Passaic River near the Long Hill and Riker Hill portions of Third Watchung Mountain - is narrow, surrounded by development, and prone to the effects of fragmentation, isolation, and an overabundant deer population. However, in a heavily urbanized environment, even degraded forests and marshes serve as critical refuges for wildlife. Most of the Meadowlands is brackish tidal habitat, but there are forested areas around Teterboro Airport and Losen Slote Park. Smaller areas of isolated freshwater wooded habitat also exist in the Meadowlands.

This CFA encompasses 1% of the Piedmont and Inner Coastal Plain Landscape Region at 7,963 hectares, including approximately 5,033 hectares of terrestrial and wetland habitats and 2,931 hectares of aquatic habitats. Approximately 2,363 hectares, or 30% of the CFA, are classified as federal, state, or county open space. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

I. Piedmont Delaware River CFA

This CFA is the portion of the Delaware River from Trenton north to the northern boundary of the Piedmont and Inner Coastal Plain Landscape Region. Its extensive riparian network and associated wetlands, forests, and farms drain into the only section of the Delaware River within the Piedmont physiographic region. The land cover in this CFA varies from a mix of agriculture and development in the eastern half and northwestern corner to mostly development in the middle. The Piedmont Delaware River CFA is New Jersey's only known spawning and nursery area for the endangered shortnose sturgeon and is part of three different Important Bird Areas that are known for a plethora of breeding forest and shrub birds of regional priority, an exceptional diversity of breeding landbirds, particularly forest and shrub birds of regional priority, and significant congregations of spring migrating and wintering waterfowl. The majority of this CFA, other than the Delaware River, is along Assunpink Creek and is owned by state, county, and municipal governments or nonprofits.

The waterways in the middle portion of the CFA are surrounded by development and impervious surfaces and as such are generally of poor quality as they are degraded from runoff of nutrients and sediments. Forests, agriculture, and grasslands are in the eastern portion and although they are less fragmented by development, few patches of forest within this CFA are large enough to buffer the effects of fragmentation from surrounding agriculture, resulting in poor to low quality wildlife habitats. Overabundant deer and invasive plants keep the diversity of shrubs at a minimum. Large hay farms can provide suitable habitat that attracts many area-sensitive species that need grasslands to breed, but they can also contribute to nutrient loading of streams from runoff.

This CFA encompasses 1% of the Piedmont and Inner Coastal Plain Landscape Region at 7,618 hectares, including approximately 6,556 hectares of terrestrial and wetland habitats and 1,063 hectares of aquatic habitats. Approximately 4,144 hectares, or 54% of the CFA, are classified as federal, state, or county open space. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

J. Shark and Navesink Rivers Watershed (Piedmont and Inner Coastal Plain) CFA

This CFA is adjacent to the Naval Weapons Station Earle CFA in Monmouth County, and is bordered to the east by the Atlantic Coast Landscape Region's Shark and Navesink Rivers Watershed (Atlantic Coast) CFA. It consists of three riparian networks of streams and rivers, and their associated wetlands, forests, and farms, within a primarily developed matrix. Parts of this CFA are within two different Important Bird Areas that are known for significant congregations of wintering waterfowl, particularly brant, greater scaup, American black ducks, and canvasbacks. The mouth of the Navesink River is tidal and contains some salt marsh and freshwater tidal marsh, a part of which is owned by the state. Very little of the Shark River in this CFA is tidal, and the forests, shrubs, and wetlands surrounding this river

are partially owned by the county. The other portions of this CFA are narrow slivers of wetlands and forests with pockets of agriculture adjacent to rivers and lakes, all of which are surrounded by development.

Water quality in this CFA is moderately to severely impaired due to pollution from runoff. The majority of the high and low salt marshes at the mouth of the Navesink River are dominated by Phragmites, creating a monoculture of poor habitat. The Swimming River portion of the Navesink is mostly surrounded by development and impervious surfaces, with the exception of some county parks. Because of the extensive development in this CFA, most areas are of poor quality and are affected by fragmentation.

This CFA encompasses 1% of the Piedmont and Inner Coastal Plain Landscape Region at 6,270 hectares, including approximately 5,827 hectares of terrestrial and wetland habitats and 443 hectares of aquatic habitats. Approximately 1,732 hectares, or 28% of the CFA, are classified as federal, state, or county open space. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

K. Sourlands CFA

This CFA lies at the boundary of Hunterdon, Mercer, and Somerset Counties and supports large forests fragmented by development and large, relatively unfragmented farms on the forest peripheries. The forests are the largest in the region and contain both Sourland and Baldpate Mountains, parts of which are owned by the state, county, municipalities, and nonprofits. The forests and farms in this CFA also contain the headwaters for the Stony Brook, Millstone, and Neshanic Rivers. The Sourlands CFA is also an Important Bird Area with breeding habitat for an exceptional diversity of landbirds, including regional priority forest and shrub species, and is a significant spring migration stopover for landbirds.

Roads and residential areas crisscross the forests, which are bordered by agricultural lands and development, while overabundant deer, invasive plants, and lack of disturbances (natural or manmade) keep the diversity of the forest understory at a minimum. Water quality in this CFA is mostly moderately impaired with a few unimpaired areas. While the overall habitat quality is moderate, it is the highest quality forest in the region. Large hay farms can provide suitable habitat for that attracts many area-sensitive species that need grasslands to breed, but they can also contribute to nutrient loading of streams from runoff.

This CFA encompasses 3% of the Piedmont and Inner Coastal Plain Landscape Region at 17,270 hectares, including approximately 17,137 hectares of terrestrial and wetland habitats and 133 hectares of aquatic habitats. Approximately 5,408 hectares, or 31% of the CFA, are classified as federal, state, or county open space. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

L. Upper Inner Coastal Plain Delaware River CFA

This CFA consists of four riparian networks of streams and rivers, and their associated wetlands, forests, and farms, which are part of or drain into the Delaware River. It includes the Pennsauken Creek Watershed north to the northern border of the Piedmont and Inner Coastal Plain Landscape Region. The majority of this CFA is developed along the Delaware

River but is more of a mix of developed and agriculture matrix farther east. It includes parts of six Important Bird Areas that are known for breeding threatened and endangered birds like peregrine falcons and grasshopper sparrows, forested wetland birds of regional priority, and significant stopovers for spring and fall migrating waterfowl and landbirds.

Tidal waters and freshwater tidal wetlands occur along the Rancocas Creek and part of Assicunk Creek, but the largest area of high quality freshwater tidal wetlands in the Piedmont Region that is not dominated by Phragmites occurs at the mouth of Crosswicks Creek. The locations with non-tidal waters are narrow riparian corridors surrounded by development, and are degraded due to pollution from runoff. At the headwaters, large patches of agriculture are buffered by small patches of forest that help maintain higher water quality. Two very small headwater areas associated with this CFA are mapped within the Pinelands Landscape Region's Upper Inner Coastal Plain Delaware River (Pinelands) CFA, but are functionally equivalent to the headwater habitats described here.

This CFA encompasses 4% of the Piedmont and Inner Coastal Plain Landscape Region at 29,772 hectares, including approximately 25,728 hectares of terrestrial and wetland habitats and 4,033 hectares of aquatic habitats. Approximately 4,929 hectares, or 17% of the CFA, are classified as federal, state, or county open space. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

M. Upper Maurice River Watershed (Piedmont and Inner Coastal Plain) CFA

This CFA consists of a riparian network and its associated wetlands, forests, and farms in a predominately agricultural matrix. It includes the western parts of the Still/Little Ease Run and Muddy Run watersheds that drain into the Maurice River.

The CFA's upland and wetland riparian forest patches are mostly narrow and fragmented by surrounding agriculture and some development making them of poor quality and limited use to wildlife. Water quality is also moderately impaired. Large hay farms can provide suitable habitat for that attracts many area-sensitive species that need grasslands to breed, but they can also contribute to nutrient loading of streams from runoff. This CFA drains to the Delaware Bay Landscape Region's Lower Maurice River Watershed CFA. Please refer to that section for additional information on habitats and their condition.

This CFA encompasses 1% of the Piedmont and Inner Coastal Plain Landscape Region at 5,755 hectares, including approximately 5,577 hectares of terrestrial and wetland habitats and 178 hectares of aquatic habitats. Approximately 170 hectares, or 3% of the CFA, are classified as federal, state, or county open space. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

Pinelands Landscape Region and Its CFAs

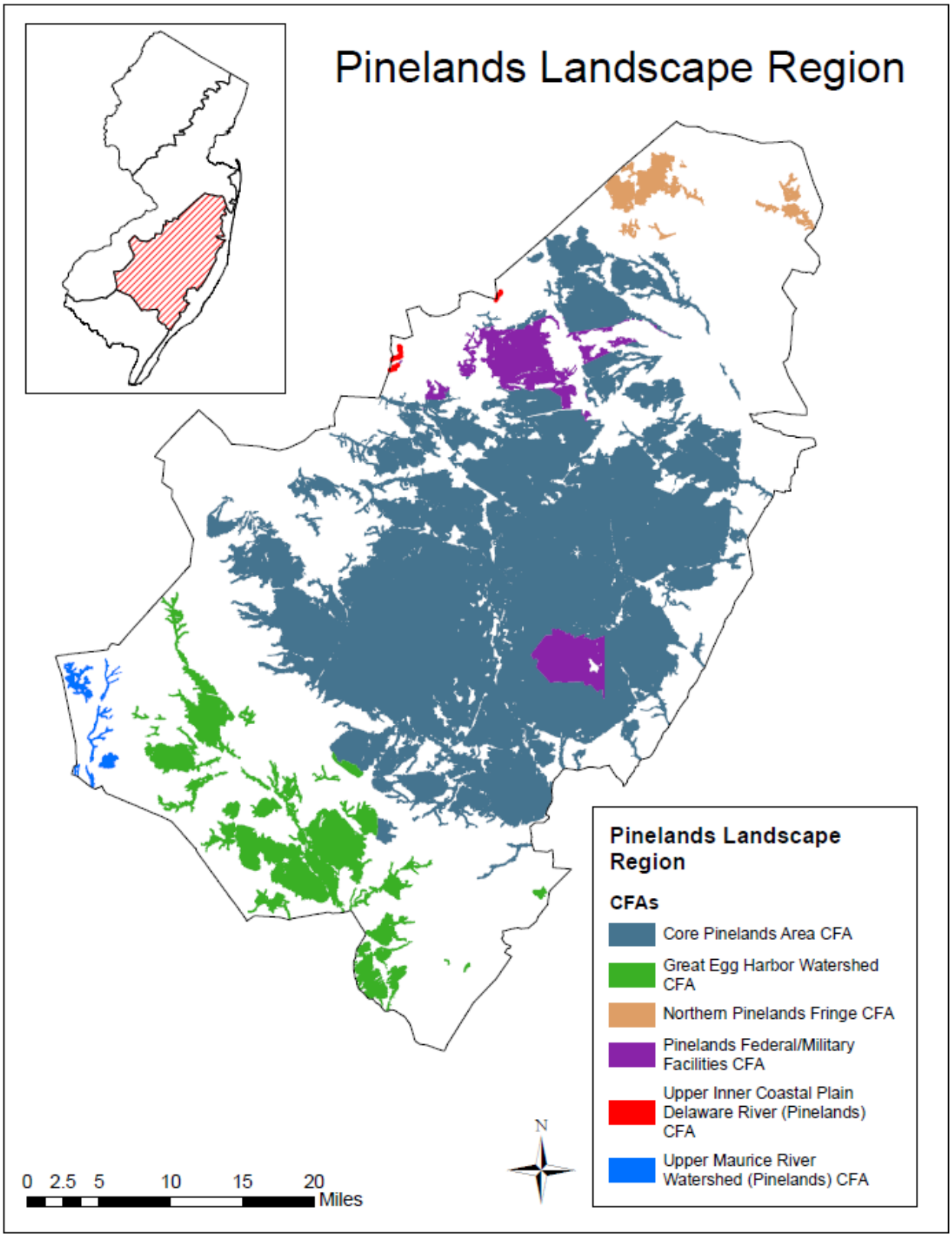


Figure 6. Pinelands Landscape Region CFAs.

This landscape encompasses all or parts of Atlantic, Ocean, Burlington, Camden, and Gloucester counties (Figure 6). New Jersey's Pinelands (or Pine Barrens) are an internationally recognized ecosystem consisting predominantly of pine and pine-oak mesic upland forests, pitch pine lowlands, and cedar swamps supporting extremely diverse reptile, amphibian, and invertebrate populations (including interior forest and area-sensitive species). Extensive cedar swamps and wetland systems contain numerous insect species, as well as sustainable populations of many neotropical birds. Its waterways support aquatic communities unique among the mid-Atlantic states, and its aquifers provide drinking water to a vast portion of the surrounding region.

Overall, the conditions of the region's habitats are very high, with vast forest and wetlands ecosystems preserved and intact, thanks not only to abundant state park and forest holdings but also to the federal designation of the more than one-million acre "Pinelands National Reserve." This designation carries strong stewardship and regulatory protections that are implemented by the New Jersey Pinelands Commission.

Notwithstanding these protections, certain habitats remain at risk. The region's scant topographic diversity makes it particularly susceptible to impacts from climate change, a current example being the region-wide introduction of southern pine beetle. Other impacts are associated with the illegal recreational use of off-road vehicles in wetlands and sensitive forest habitats, the effects of regional groundwater withdrawals, and the slow conversion of the climax forest structure. This forest structure was historically maintained by wildfires and more recently by human activities such as logging and charcoal production which maintained re-occurring openings in the canopy and sustained a pine-dominated composition. Combined with restrictions and market-driven reductions in logging or forestry activities, the changes in wildfire patterns are converting the forest to a consistently closed canopy condition, and the species composition is slowly changing to include more deciduous hardwoods.

A. Northern Pinelands Fringe CFA

The Northern Pinelands Fringe CFA is composed of wetland and upland forest and wetland corridors associated with the Manasquan River and Metedeconk River drainages. While the forest structure tends to be more deciduous in nature than the core Pinelands, the area does share many similarities with the true Pine Barrens to the south. Significant portions of the CFA are preserved in Allaire State Park, Turkey Swamp Park, and other county and municipal holdings. However, some properties in the southern section of this CFA are privately held and may face imminent development. The CFA continues to support the northernmost occurrences of some important Pinelands or coastal plain species such as northern pine snake, pine barrens treefrog, and swamp pink. It also represents important core areas at risk of fragmentation from remaining Pinelands ecosystems to the south.

The habitats in this CFA are generally smaller in size and more amorphous in shape than others in the Pinelands Landscape Region. As a result, these habitats tend to have smaller core areas that are more susceptible to adverse impacts from adjacent edge effect influences. While many of the habitats within this CFA are preserved under state and county ownership and benefit from associated management efforts, there are also privately-owned areas that receive no direct state or county stewardship.

This CFA encompasses 1% of the Pinelands Landscape Region at 4,053 hectares, including approximately 4,021 hectares of terrestrial and wetland habitats and 33 hectares of aquatic habitats. Approximately 2,930 hectares, or 72% of the CFA, are classified as federal, state, or county open space. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

B. Core Pinelands Area CFA

The Core Pinelands Area CFA consists of the expansive pine and pine/oak forests, forested wetlands, and largely intact stream corridors that make up the Pinelands Protection Area. Extensive tracts are preserved as state parks, forests, wildlife management areas, or in county, municipal, and nonprofit preserves. Development in most remaining lands is carefully planned by the Pinelands Commission. As such, the area remains the state's largest, most intact forest ecosystem. The Core Pinelands Area CFA encompasses the majority of the Mullica River watershed, making the watershed one of the most pristine and best protected in the state. Portions of the Barnegat and Rancocas Watersheds are also represented. The area's ecology is driven primarily by the sandy, highly permeable, and nutrient poor coastal plain soils. Fire ecology has been a historically significant driver of plant and animal communities in the CFA, though with development and the associated need for fire suppression and management, this critical factor is likely forever altered. The Core Pinelands Area CFA is well known for its unique and diverse faunal communities, including many Pine Barrens specialists that warranted specific grouping as Focal SGCN, such as the "Pine Barrens Snakes" and the "Pine Barrens Moths."

Habitats within this CFA are generally considered to be of high quality in comparison to other areas of the state. Very large core areas of forest, extensive public ownership, management, and limited adjacent development have maintained highly functioning natural communities. While the CFA experiences very little development pressure, the sandy soils and generally high water table make many areas susceptible to disturbance from agriculture, groundwater withdrawal, sand and gravel mining, and impacts from controlled or uncontrolled fire and illegal on- and off-road vehicular recreation. The slow conversion of forest types due to the past few decades of fire suppression and wildfire management is a long-term concern regarding habitat quality within this CFA.

This CFA encompasses 36% of the Pinelands Landscape Region at 164,798 hectares, including approximately 160,794 hectares of terrestrial and wetland habitats and 4,004 hectares of aquatic habitats. Approximately 115,738 hectares, or 70% of the CFA, are classified as federal, state, or county open space. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

C. Federal/Military Facilities CFA

This CFA consists of largely undisturbed forests, wetland forests, and riparian corridors that exist on the federal properties comprising the Joint Base McGuire-Dix-Lakehurst and the Warren Grove Gunnery Range. The large intact ecosystems on these installations, historically sheltered from traditional residential, recreational, and commercial development pressures, receive additional benefit from site-specific Integrated Natural Resource Management Plans. While management under these plans only applies to federally listed

species, state species of concern often receive umbrella protection or thrive under the routine management of anthropogenic conditions on the installations.

The habitats are generally of very high quality within the natural communities and ecosystems. While facility site improvements and expansions do sometimes occur, the habitats within this CFA are largely protected from the rampant development that might otherwise occur and the illegal intrusion of vehicles and collectors. They are also managed to protect federally listed species.

This CFA encompasses 2% of the Pinelands Landscape Region at 10,729 hectares, including approximately 10,570 hectares of terrestrial and wetland habitats and 159 hectares of aquatic habitats. None of the CFA is classified as federal, state, or county open space. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

D. Great Egg Harbor Watershed CFA

Draining to the Great Egg Harbor, this CFA area is of great importance to the maintenance of water quality for the abundant fishery resources throughout the watershed, as well as the fauna that forage and nest in it. The area has an active watershed association, and nonprofit involvement and stewardship could offer meaningful opportunities for action implementation throughout the CFA. This CFA is a mix of preserved and private lands, though it appears that even the private lands are largely built out or are likely constrained by wetlands and floodplains.

The habitats in this CFA are generally of high quality as there is a good core of abundant wetlands and watercourses that are protected and buffered by state regulations. It is also difficult for the public to enter this core area. The edges of the CFA abut many developed areas and experience typical edge effects including nonpoint pollution, the use of off-road vehicles, and the introduction of invasive plant species.

This CFA encompasses 5% of the Pinelands Landscape Region at 22,351 hectares, including approximately 21,777 hectares of terrestrial and wetland habitats and 574 hectares of aquatic habitats. Approximately 13,019 hectares, or 58% of the CFA, are classified as federal, state, or county open space. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

E. Upper Inner Coastal Plain Delaware River (Pinelands) CFA

Several very small headwater tributaries to the Delaware River originate in this CFA but immediately enter the Piedmont and Inner Coastal Plain Landscape Region's Upper Inner Coastal Plain Delaware River CFA. As the habitats within these CFA's are functionally equivalent, please see the habitat description and condition information in the Piedmont and Inner Coastal Plain Landscape Region's Upper Inner Coastal Plain Delaware River CFA.

This CFA encompasses 0.02% of the Pinelands Landscape Region at 74 hectares, including approximately 73 hectares of terrestrial and wetland habitats and 1 hectares of aquatic habitats. Approximately 9 hectares, or 12% of the CFA, are classified as federal, state, or

county open space. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

F. Upper Maurice River Watershed (Pinelands) CFA

This CFA consists of the northeastern headwaters of the Maurice River watershed. It includes a riparian network made up by Little Ease Run and Scotland Run, along with their associated wetlands and forests. A significant portion of the CFA is preserved in the Glassboro Wildlife Management Area and Gloucester County's Scotland Run Park. There are also portions of the CFA that are privately held and susceptible to development. The CFA is in many ways functionally equivalent to the Delaware Bay Landscape Region's Lower Maurice River Watershed CFA. Please refer to that section for additional information on the CFA's habitat types, conditions, and values.

This CFA encompasses 0.3% of the Pinelands Landscape Region at 1,519 hectares, including approximately 1,446 hectares of terrestrial and wetland habitats and 74 hectares of aquatic habitats. Approximately 679 hectares, or 45% of the CFA, are classified as federal, state, or county open space. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

Skylands Landscape Region and Its CFAs

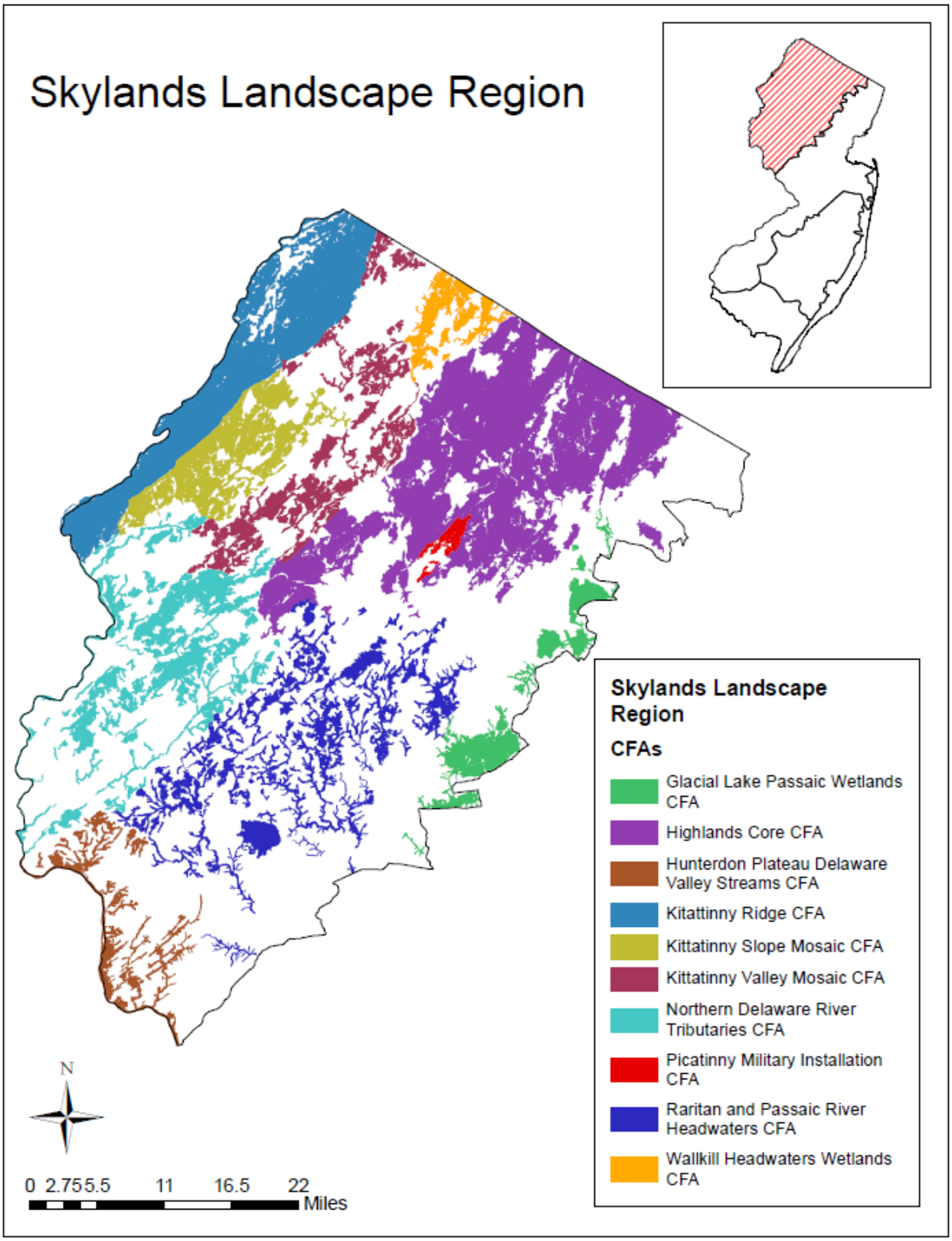


Figure 7. Skylands Landscape Region CFAs.

This landscape region combines two of New Jersey's physiographic regions, the Ridge & Valley and the Highlands. It encompasses all or parts of Sussex, Warren, Hunterdon, Somerset, Passaic, Essex, Bergen, and Morris Counties (Figure 7). The region is a mosaic of habitat types including forest, forested wetland, and scrub-shrub habitats that are vital to a variety of species.

The conditions of the region's habitats vary significantly between both types and places. Some of the highest quality habitats can be found on conserved properties where there are extensive tracts of interior forest habitat for area-sensitive species. Threats to forests in the region, however, include a lack of long-term management that has reduced structural diversity, deer browse and a lack of sunlight that have left the understory barren in many places, and an abundance of invasive species. Scrub-shrub habitat is uncommon due to succession to closed-canopy forest, and remaining patches are threatened by development and over-browsing by deer.

A. Kittatinny Ridge CFA

The Kittatinny Ridge CFA features significant topography and ridgeline associated with the Appalachian Mountains, vast mature contiguous forests, and small to medium sized watersheds of remarkable water quality. Topography and geologic aspect have created a variety of unique habitats such as talus slopes and bare rock outcrop found nowhere else in the state, and the westerly slopes and lower elevations extending to the Delaware River contribute distinctive habitats including seeps, limestone fens, and hemlock ravines. Much of the Kittatinny Ridge is protected state and federal land. While the Flatbrook and other watercourses of medium drainage areas provide abundant aquatic resources, numerous additional watercourses of extremely small drainage areas flow directly to the Delaware River and support salamander assemblages found nowhere else in the state. Forest management that focuses on eliminating invasive plants and creating a habitat mosaic while retaining older forest stands could improve diversity in mid- and lower elevation habitats and benefit rare species.

The ridgetop features xeric communities such as pitch pine and chestnut oak that are generally of high quality and consist mostly of native vegetation. The ridgetop's harsher conditions (e.g., wind exposure and thin soils) stunt some plant communities, creating a mosaic of habitats and species diversity. These communities could be in jeopardy due to fire suppression, as without fire they will be replaced by oak forest over time. Such a shift would shade out currently sun-exposed areas that are critical to rare reptiles and barren ground-nesting birds, and cause vegetative changes that could alter food resources for wildlife. The westerly slopes and lower elevations have been greatly impacted by the agriculture of early settlers, leaving behind nutrient poor soil with a plethora of invasive plants; however, these areas still include a diverse suite of habitats, including hemlock forests, springs, fens, ravines, and ephemeral wetlands, important to a variety of wildlife.

This CFA encompasses 7% of the Skylands Landscape Region at 36,446 hectares, including approximately 34,600 hectares of terrestrial and wetland habitats and 1,846 hectares of aquatic habitats. Approximately 29,176 hectares, or 80% of the CFA, are classified as federal, state, or county classified as federal, state, or county open space. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

B. Kittatinny Slope Mosaic CFA

The Kittatinny Slope Mosaic CFA showcases broad forest patches mixed with agriculture and grasslands in the shadow of the Kittatinny Ridge. The CFA is the bridge between the Kittatinny Valley Mosaic CFA and the Kittatinny Ridge CFA with distinctive geology and management needs. Bobcats travel along the slopes, and the bottomlands include the key Paulins Kill drainage tributaries that feature one of the most significant populations of a federally listed mussel species in the state along with wood turtles and trout streams. The higher elevations of the slopes feature xeric communities such as pitch pine and chestnut oak while the lower elevations are more representative of the overall Skylands Regional Landscape.

Fire suppression has been and continues to alter the mid- and higher elevation vegetation over time, converting the landscape to an oak forest that shades out the slopes and alters the thermal characteristics critical for rare reptiles and barren ground-nesting birds.

This CFA encompasses 3% of the Skylands Landscape Region at 15,700 hectares, including approximately 14,715 hectares of terrestrial and wetland habitats and 985 hectares of aquatic habitats. Approximately 5,371 hectares, or 34% of the CFA, are classified as federal, state, or county classified as federal, state, or county open space. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

C. Kittatinny Valley Mosaic CFA

The Kittatinny Valley Mosaic CFA supports many of the remaining undeveloped natural communities that are home to some of the state's rarest terrestrial wildlife, such as the bog turtle. The value of this CFA is not only in what remains, but in its potential to link the largely protected Kittatinny Ridge and Highlands Core CFAs. The valley is characterized by expansive agriculture and grasslands among rolling forested hillsides and distinctive groundwater fed wetland complexes. The valley contains a mosaic of habitats ranging from small forest tracts to scrub-shrub habitats and agricultural grasslands.

Habitat conditions within the valley are representative of the overall Skylands Regional Landscape. While the wildlife habitat within this area is not considered poor quality, as a patchwork of natural lands among a more human-modified landscape, this area would benefit from restored connectivity to best provide live-in and corridor habitats for wildlife. Increasing forest management and broad restoration of inactive agricultural lands could increase overall biodiversity in this CFA.

This CFA encompasses 3% of the Skylands Landscape Region at 17,050 hectares, including approximately 16,107 hectares of terrestrial and wetland habitats and 943 hectares of aquatic habitats. Approximately 4,188 hectares, or 25% of the CFA, are classified as federal, state, or county open space. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

D. Wallkill Headwaters Wetlands CFA

The Wallkill Wetlands CFA is primarily protected federal and state land featuring lower gradient floodplain wetlands and connecting uplands between New Jersey's portion of the lower Wallkill River Valley and Vernon Valley. These areas represent the largest intact river floodplains in the northern part of the state and are valuable for migrating passerines and resident species like Indiana bats, bronze copper butterflies, wood turtles, and blue-spotted salamanders. Breeding grassland birds and raptors thrive here as well. This majority lowland wetland CFA is also a key bridge to the more mountainous, adjacent Highlands Core CFA.

Habitats within this CFA are generally of good to moderate quality, although management of invasive plants and maintaining or increasing native plant community diversity along riparian floodplains would strengthen the overall resilience of this CFA. Portions of the critically important wetlands, invaded by non-native plants, within this CFA have unique restoration needs compared to those within the larger region and such restoration would benefit aquatic and semi-aquatic species. Agricultural practices threaten habitats and wildlife by contributing sediment, phosphorus, and fecal coliform to waterways.

This CFA encompasses 1% of the Skylands Landscape Region at 5,451 hectares, including approximately 5,272 hectares of terrestrial and wetland habitats and 179 hectares of aquatic habitats. Approximately 1,565 hectares, or 29% of the CFA, are classified as federal, state, or county open space. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

E. Highlands Core CFA

The Highlands Core CFA is composed of mostly protected contiguous high elevation forest. Timber rattlesnakes, bobcats, barred owls, and red-shouldered hawks all depend on these lands to sustain their populations. These are also key recovery areas for golden-winged warblers and other declining songbirds. A large portion of the Highlands Preservation Area is within the boundary of this CFA.

The habitats and conditions in this CFA are similar to those described for the Skylands Regional Landscape. They are generally of high quality but have fewer invasive plants than are found in the lower elevations of the Kittatinny Ridge CFA. However, diversifying forest age class and reducing forest-floor invasive plants would help secure wildlife populations and support colonization by additional animal species.

This CFA encompasses 14% of the Skylands Landscape Region at 75,140 hectares, including approximately 69,626 hectares of terrestrial and wetland habitats and 5,515 hectares of aquatic habitats. Approximately 40,213 hectares, or 54% of the CFA, are classified as federal, state, or county open space. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

F. Glacial Lake Passaic Wetlands CFA

The Glacial Lake Passaic Wetland CFA features bottomland hardwood floodplain complexes that remain in good condition. These wetlands are all within the Passaic River watershed and

include vernal pool complexes that support blue-spotted salamander populations. There are few remaining undeveloped areas in this region.

Invasive plants and a lack of forest management imperil the persistence of wildlife diversity within this CFA. As such, habitat management including the treatment of invasive plants and selective forest management would greatly benefit the species diversity. In addition, streambank and riparian restoration may be beneficial in more flood-prone sections to reduce stream siltation and channelization.

This CFA encompasses 2% of the Skylands Landscape Region at 9,655 hectares, including approximately 9,309 hectares of terrestrial and wetland habitats and 346 hectares of aquatic habitats. Approximately 6,832 hectares, or 71% of the CFA, are classified as federal, state, or county open space. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

G. Raritan and Passaic River Headwaters CFA

The Raritan and Passaic River Headwaters CFA includes important aquatic areas in the North Branch Raritan River, South Branch Raritan River, and Passaic River watersheds. The Passaic River headwaters were included with the North and South Branches of the Raritan River in this CFA to distinguish the Passaic headwater areas from the lower gradient, floodplain dominated Glacial Lake Passaic Wetlands CFA. Both the Passaic headwaters and the expansive North and South Branch Raritan River headwaters feature moderate gradient streams of high water quality, narrow floodplains mixed with agriculture, and wooded hillsides.

The conditions within this CFA vary by area and watershed. Agricultural practices in headwater regions threaten aquatic habitats and wildlife by increasing sediment, phosphorus, and fecal coliform in waterways, and the lack of riparian buffers contributes to erosion and water quality degradation. Aquatic, semi-aquatic, and riparian species and their habitats are also threatened by point and nonpoint source pollution and flooding that erodes banks and scours stream bottoms. Streambank and riparian restoration may be beneficial in more flood-prone sections to reduce stream siltation and channelization.

This CFA encompasses 5% of the Skylands Landscape Region at 27,191 hectares, including approximately 24,829 hectares of terrestrial and wetland habitats and 2,362 hectares of aquatic habitats. Approximately 11,372 hectares, or 42% of the CFA, are classified as federal, state, or county open space. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

H. Northern Delaware River Tributaries CFA

The Northern Delaware River Tributaries CFA highlights predominantly aquatic and riparian corridors of the Musconetcong River, Pequest River, and Paulins Kill watersheds from their headwaters to confluences with the Delaware River. These watercourses feature extremely large drainage basins with broad floodplains that are often closely associated with agriculture. The CFA captures both aquatic areas and undeveloped buffer uplands. Dwarf wedgemussels, triangle floaters, longtail salamanders, and wood turtles are dispersed throughout these basins.

The conditions within this CFA vary by area and watershed. The Category 1 classification of many stream stretches indicates that these waterways are of high quality. There are dams scattered throughout the waterways, and much effort has been expended on dam removal projects (particularly along the Musconetcong River) to enhance fish migration, improve water quality, and help to eliminate flood hazards. Aquatic, semi-aquatic, and riparian species and their habitats are also threatened by point and nonpoint source pollution and flooding that erodes banks and scours stream bottoms. Streambank and riparian restoration may be beneficial in more flood-prone sections to reduce stream siltation and channelization.

This CFA encompasses 4% of the Skylands Landscape Region at 24,115 hectares, including approximately 22,430 hectares of terrestrial and wetland habitats and 1,683 hectares of aquatic habitats. Approximately 7,156 hectares, or 30% of the CFA, are classified as federal, state, or county open space. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

I. Hunterdon Plateau Delaware Valley Streams CFA

The Hunterdon Plateau Delaware Valley Streams CFA is focused on aquatic areas that largely consist of small drainages and moderate gradient streams that drain directly to the Delaware River. In otherwise highly developed areas, these riparian corridors often represent the best dispersal pathways for local wildlife. Longtail salamanders inhabit stretches of streams while breeding bobolinks, eastern meadowlarks, and grasshopper sparrows are present in adjacent grasslands.

The habitat conditions within this CFA vary by area and watershed. Much of the area is designated Category 1, indicating that these waterways are of high quality. Changing land use practices, the loss of stream buffers, and the addition of impervious surfaces continue to impact natural habitats and wildlife by increasing the likelihood of point and nonpoint source pollution into waterways. Also, flooding from extreme storms could erode banks and scour stream bottoms. The spread of the highly invasive Chinese pond mussels remains a serious threat to native freshwater mussels in Wickecheoke Creek and tributaries, and possibly the Delaware River.

This CFA encompasses 1% of the Skylands Landscape Region at 7,633 hectares, including approximately 6,480 hectares of terrestrial and wetland habitats and 1,152 hectares of aquatic habitats. Approximately 1,633 hectares, or 21% of the CFA, are classified as federal, state, or county open space. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

J. Picatinny Military Installation CFA

The Picatinny Military Installation CFA lies within the Highlands physiographic region. It is characterized by the bedrock features of Green Pond Mountain and includes Lake Denmark and Picatinny Lake. This federally managed military installation is home to rare reptiles, raptors, and songbirds, with bobcats also traversing the elevated terrain. Containing nearly 6,000 acres of ridgeline, slopes, and valley floor, approximately 70% of the installation is forested with only 19% developed.

Although much of the natural landscape is used for military training and ordinance testing, the habitats within this CFA are generally healthy forests that are largely protected from outside commercial and residential development. Habitat restoration for federal species is a management priority and restricted access to the installation protects against illegal intrusion by vehicles and wildlife poachers. However, as with many areas within New Jersey, diversifying forest age class and eliminating forest floor invasive plant species would help secure wildlife populations and support colonization by additional animal species.

This CFA encompasses 0.2% of the Skylands Landscape Region at 1,357 hectares, including approximately 1,201 hectares of terrestrial and wetland habitats and 156 hectares of aquatic habitats. None of this CFA is classified as federal, state, or county open space. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

Marine Landscape Region and Its CFAs

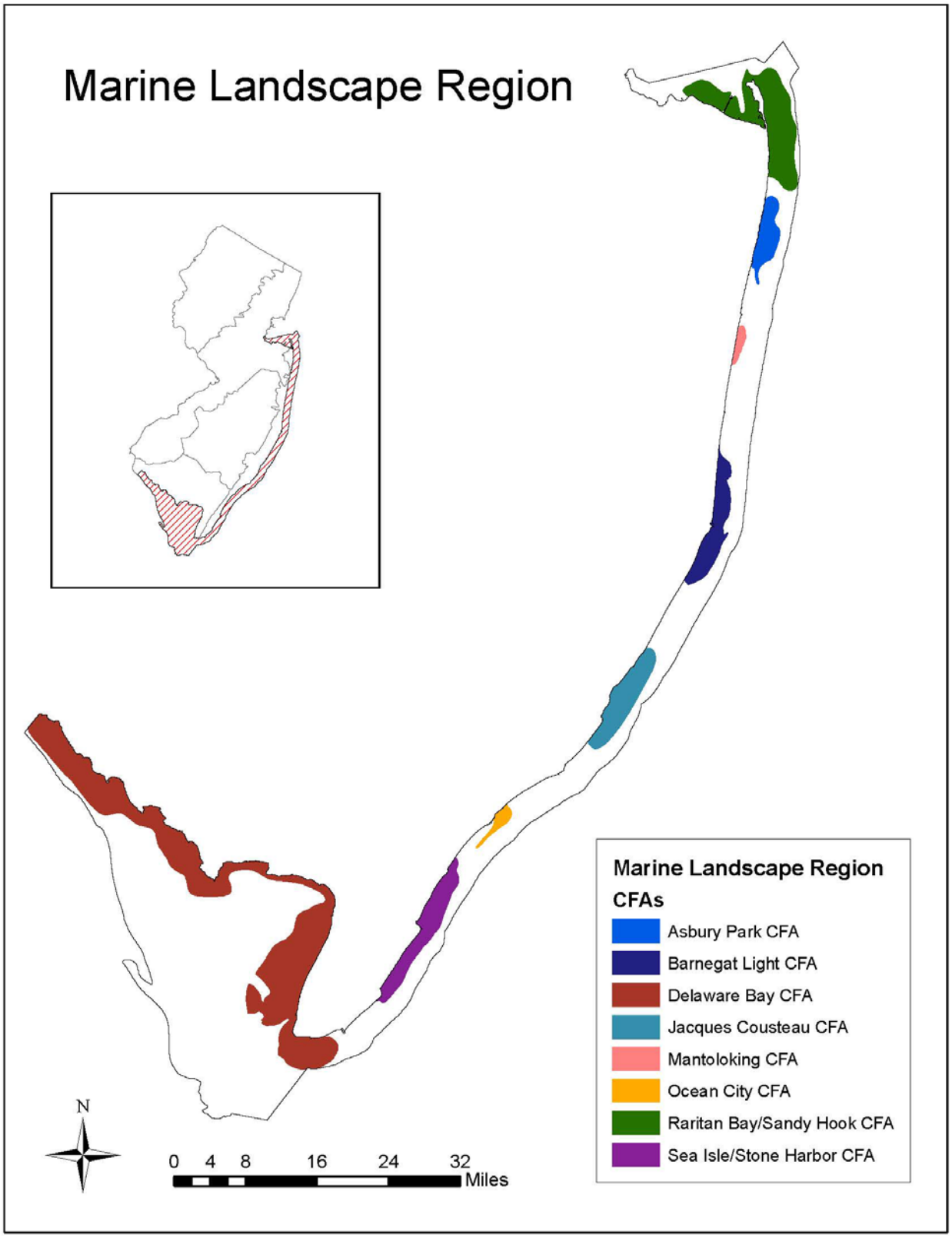


Figure 8. Marine Landscape Region CFAs.

This region is exclusively aquatic and includes the New Jersey portion of the Delaware and Raritan Bays (Figure 8). It also includes the Atlantic Ocean within the state's jurisdiction, which is defined as the area within 3-nautical miles of the New Jersey shoreline. This region supports fish and shellfish of commercial and recreational importance. More than half of New Jersey's federally listed species are found exclusively within this region, including several species of whales and sea turtles, as well as Atlantic sturgeon. The waters of the Delaware Bay are critical habitat to one of the largest populations of horseshoe crabs in the world. During the summer, near-shore Atlantic Ocean waters are calving and nursery grounds for bottlenose dolphins, while many additional species utilize these waters as a migratory corridor.

The condition of the Marine Landscape Region's water is highly variable. Overall water quality has shown continuing improvements over the last few decades including all ocean beaches fully supporting their designated uses and shellfish harvesting allowable at over 95% of Raritan Bay, Delaware Bay, and ocean waters. However, these areas continue to be degraded by point and nonpoint source pollution from a variety of sources. Low dissolved oxygen levels have been reported in the ocean along the entire New Jersey coast; efforts are now underway by the NJDEP to determine impacts and if low dissolved oxygen events are natural occurrences. Excessive nutrient loading may lead to harmful algal blooms that can kill other marine organisms or transfer toxins up through the food chain. Expansion of aquaculture, particularly shellfish aquaculture, may have unintended and unanticipated adverse impacts on marine wildlife.

Increases in water temperature due to climate change are altering marine ecosystems, impacting species such as surf clams (which are moving into deeper, cooler waters), and finfish (some of which are redistributing northward). Additionally, higher levels of carbon dioxide are causing ocean water to become more acidic, potentially inhibiting the ability of clams, sea urchins, and other species to produce calcium shells and exoskeletons. Sea level rise and the movement of highly saline water into estuarine areas threaten the breeding and nursery habitats of numerous fish species, and could eliminate important haul outs for seals. Native marine wildlife are threatened by invasive species including the Asian shore crab, Chinese mitten crab, and European periwinkle, as well as persistent marine debris (such as plastic bags, fishing line, and other derelict fishing gear). Marine wildlife are also vulnerable to ship strikes, especially in high use areas of Raritan and Delaware Bays, and to entanglement or entrapment in commercial and recreational fishing gear.

A. <u>Raritan Bay/Sandy Hook CFA</u>

The Raritan Bay/Sandy Hook CFA encompasses portions of Raritan and Sandy Hook Bays, and the surrounding Gateway National Recreation Area. It extends from estuarine waters off Union Beach Borough to Middletown Township and south along the coast to the marine waters just off Monmouth Beach. The area is part of an important travel corridor between the ocean and Raritan Bay/River, which is critical to the life history of a multitude of fish species for spawning and migration. The CFA serves as a critical overwintering area for seals and is migratory habitat for humpback, fin, and right whales and three species of sea turtles. It is also a migrating shorebird concentration site. An artificial reef within the CFA provides shelter, nursery, and feeding habitat for numerous marine fish and macroinvertebrate species. Varying substrate types and depths are present in this CFA.

The area is threatened by a myriad of anthropogenic sources, including point and nonpoint source pollution. Nutrient loading may lead to algal blooms within the bays, which can be harmful to marine organisms or transfer toxins up through the food chain, and regional industrial development has led to elevated PCB levels in fish. Sea level rise may impact islands serving as seal haul out sites.

This CFA encompasses 5% of the Marine Region with 15,417 hectares of estuarine and marine habitats. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

B. Asbury Park CFA

The Asbury Park CFA extends from the shoreline into marine waters off Long Branch City south to Spring Lake Borough. It is an important feeding area for species such as great blue herons and black crown night herons, and is migratory habitat for humpback, fin, and right whales. Varying substrate types and depths are present in this CFA. As noted in the overview for the Marine Landscape Region, habitat conditions are highly variable.

This CFA encompasses 1% of the Marine Region with 4,074 hectares of estuarine and marine habitats. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

C. Mantoloking CFA

The Mantoloking CFA is located below Manasquan Inlet, from the marine waters off Point Pleasant Beach to just off Brick Township. The area serves as critical feeding habitat for ospreys, black crowned night herons, and snowy egrets. It also serves as a migratory area for humpback, fin, and right whales, harbor porpoises, and bottlenose dolphins. Numerous shipwrecks within the CFA area provide shelter and feeding opportunities for a variety of marine fish and macroinvertebrate species. This CFA includes a variety of habitats and depths. As noted in the overview for the Marine Landscape Region, habitat conditions are highly variable.

This CFA encompasses 0.01% of the Marine Region with 888 hectares of estuarine and marine habitats. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

D. Barnegat Light CFA

The Barnegat Light CFA extends from the shoreline into the marine waters off Berkeley Township to Long Beach Township. The CFA provides important feeding habitat for bird species such as roseate tern, black skimmer, little blue heron, and snowy egret. It also serves as a migratory corridor for leatherback and loggerhead sea turtles, humpback, fin, and right whales, and overwintering seals that haul out on shore near the mouth of the Barnegat Inlet. The area is part of an important travel corridor between the ocean and Barnegat Bay, which is critical to the life history of a multitude of fish species for spawning and migration. Varying substrate types and depths are present in this CFA. As noted in the overview for the Marine Landscape Region, habitat conditions are highly variable. Sea haul out sites may be inundated as sea level rises.

This CFA encompasses 2% of the Marine Region with 6,698 hectares of estuarine and marine habitats. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

E. Jacques Cousteau CFA

The Jacques Cousteau CFA extends from the shoreline into marine waters off Beach Haven Borough to Little Egg Inlet and south to Brigantine City. It serves as an important feeding area for bird species such as osprey, little blue heron, and Caspian tern. It is a migratory corridor for leatherback and loggerhead sea turtles, humpback, fin, and right whales, and bottlenose dolphins and harbor porpoises. The CFA is part of an important travel corridor between the ocean and the estuarine waters of Great Bay, which are critical to the life history of a multitude of fish species for spawning and migration. It is also an important corridor for overwintering seals that feed in deep channels and haul out on the sandy beaches of bay islands. Varying substrate types and depths are present in this CFA.

This CFA encompasses 3% of the Marine Region with 7,212 hectares of estuarine and marine habitats. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

F. Ocean City CFA

The Ocean City CFA is located from the shoreline into marine waters off Longport Borough and extends south to Ocean City. The area is part of an important travel corridor between the Atlantic Ocean and the Great Egg Harbor estuary and river, which are critical to the life history of a numerous fish species for spawning and migration. It is an important feeding area for black crowned night herons and black skimmers. It is also serves as important habitat for migrating leatherback and loggerhead sea turtles, humpback, fin, and right whales, and harbor porpoises and bottlenose dolphins. Varying substrate types and depths are present in this CFA.

This CFA encompasses 0.01% of the Marine Region with 1,172 hectares of estuarine and marine habitats. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

G. Sea Isle/Stone Harbor CFA

The Sea Isle/Stone Harbor CFA extends from the shoreline into marine waters off Ocean City south to North Wildwood, and includes Townsends Inlet and Hereford Inlet. It serves as an important feeding area for bird species such as osprey, black skimmer, and great blue heron. Coastal waters of the CFA provide migratory habitat for humpback, fin, and right whales, bottlenose dolphin, harbor porpoise, leatherback and loggerhead sea turtles, and Atlantic sturgeon. Varying substrate types and depths are present in this CFA.

This CFA encompasses 3% of the Marine Region with 7,667 hectares of estuarine and marine habitats. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

H. Delaware Bay CFA

The Delaware Bay CFA is the largest in the Marine Landscape Region, extending from the shoreline into saline waters off Cape May City, surrounding Cape May point, and continuing northwest to the Heislerville Wildlife Management Area in Lower Alloway Creek Township. The area serves as an important habitat and travel corridor for migrating fish species such as striped bass, Atlantic and shortnose sturgeon, and alewife and blueback herring that spawn in the freshwater reaches of the Delaware River. Estuarine waters provide feeding areas for four species of migrating sea turtles. In addition, the CFA lies within a known migrating shorebird concentration area, providing critical stopover habitat to species such as red knot. Humpback and fin whales, along with other marine mammals, have also been documented within the CFA. A variety of depths and fluctuations in salinity and other factors create highly variable and ever-changing habitat conditions in this CFA.

As in the Atlantic Coast Landscape Region's Sandy Hook CFA, offshore and on-land human activities threaten this CFA. For example, excessive nutrient loading from both point and nonpoint source pollution can lead to harmful algal blooms, which can kill other marine organisms and/or transfer toxins up through the food chain. Aquaculture practices imperil wildlife within a portion of the intertidal zone by disturbing feeding shorebirds and blocking horseshoe crabs from reaching beach habitat to lay eggs. Ghost crab pots can inflict long-term harm to wildlife, such as diamondback terrapins, by continuously entrapping organisms. Boat strikes remain a serious threat to Atlantic sturgeons, sea turtles, and other marine wildlife. Since the Delaware Bay and River serve as the largest oil transfer port on the East Coast, the potential for catastrophic oil spills is an ever-present threat to aquatic habitats and wildlife.

This CFA encompasses 16% of the Marine Region with 46,418 hectares of estuarine and marine habitats. Details regarding the habitat types that comprise this CFA are presented in Appendix G.

IV. Notes Regarding Habitat Classifications Used or Referenced in this Plan

The NJDEP began Geographic Information Systems (GIS) mapping of New Jersey's land use/land cover in the late 1980s. These maps, which followed a modified Anderson[1] classification scheme, were based on the hand digitization of color infrared photography into polygons representing distinct land use/land cover types, which were then converted into a land use/land cover GIS digital file. This mapping is now in its fifth iteration based on 2012 aerial photo imagery. The DFW began using this GIS resource to assess and depict occurrences and

[1] Anderson *et al.,* 2013

distribution of wildlife species habitats in 1994, when it created the first version of the New Jersey Landscape Project. The Landscape Project maps depict areas of contiguous habitat known to be used by or necessary to sustain state endangered and threatened species and other priority wildlife. Updated in early 2017, Landscape Project mapping continues to rely upon New Jersey's land use / land cover data as a base layer, and remains the principal basis for the DFW's mapping of habitats for endangered, threatened, and special concern wildlife species.

Following the first development of State Wildlife Action Plans in 2005, Northeast states collaborated on the development of a shared system for habitat classification and mapping: the Northeast Terrestrial Wildlife Habitat Classification System (NETWHCS). This system is a flexible framework for characterizing wildlife habitats by integrating two approaches – habitat systems and structural modifiers. The basic layer is the habitat systems which correspond to the Ecological Systems developed by NatureServe[2], with additional systems for altered habitats and land-use types. Ecological Systems are "recurring groups of biological communities that are found in similar physical environments and are influenced by similar dynamic ecological processes" [3] and are based on biogeographic region, landscape scale, dominant cover type, and disturbance regime. Because most habitat systems can incorporate substantial variation in vegetative species dominance, structure, successional stage, and other characteristics that are relevant to wildlife use, the classification superimposes a set of structural modifiers. A companion set of terrestrial and aquatic habitat maps were created for the Northeast[4].

Because the NETWHCS does not capture small-patch habitat systems, because the NJDEP maps are to a finer scale and are more spatially accurate, and to make New Jersey's State Wildlife Action Plan relevant and accessible to New Jersey's users, the DFW decided to continue using the New Jersey land use/land cover mapping to describe and depict wildlife habitats for this plan. To facilitate use of this plan at multi-state and regional levels, the DFW created a crosswalk between these two habitat classification/mapping schemes (Appendix F). Appendix F also includes a crosswalk between the New Jersey land use/land cover categories and the broad habitat categories used to identify the habitats used by Species of Greatest Conservation Need (Appendix C) and those used for the characterization of Conservation Focal Areas (Appendix G).

[2] Gawler *et al.*, 2008
[3] Comer *et al.*, 2003
[4] Anderson *et al.*, 2013

CHAPTER 3: THREATS AND ACTIONS FOR FOCAL WILDLIFE & HABITATS

This State Wildlife Action Plan is made necessary and relevant by the number of New Jersey's wildlife species that face threats that could jeopardize their continued existence in the state and beyond. At the same time, actions to address these threats are directed at aiding species recovery to the point that they no longer need to be officially listed or keeping them from declining to the point where they would need to be listed. The following sections provide an overview of the wide-ranging threats facing New Jersey's wildlife and their habitats, needed research and outreach to guide conservation efforts, referred to as "action drivers," and conservation actions to ameliorate the threats and address the action drivers.

In this plan, information on threats and related actions is presented in three formats to help users of the plan develop and implement conservation projects that also fulfill their agency's or organization's mission. First, detailed lists of threats and action drivers (hereafter simply called threats) and conservation actions are provided in Appendices H and I, respectively. These lists provide the base information needed to develop projects focused on the conservation of SGCN and their habitats. In addition, the DFW has prepared two reports that present threats and associated conservation actions as they apply to the 48 individual Focal SGCN and Focal SGCN guilds (Appendix J: *Threats to and Conservation Actions for the Focal Species of Greatest Conservation Need*) and broader conservation issues (Appendix K: *Projects to Conserve New Jersey's Wildlife Populations of Concern*). Both are described below and should assist conservation partners in tailoring their conservation efforts to achieve the greatest benefits for New Jersey's imperiled wildlife.

I. Overview of Threats to Wildlife and Their Habitats

A. Building a Common Lexicon to Characterize Regional and Statewide Threats

Like the ranges of wildlife species themselves, the threats affecting SGCN commonly go well beyond the borders of individual states. As such, the actions needed to address these threats may be best accomplished through coordinated regional efforts. In the past, disparities in the language that individual states used to characterize threats to their SGCN impeded regional collaboration. Therefore, for this round of State Wildlife Planning, New Jersey and other Northeastern states agreed to use common lexicons for describing threats and developing actions to address them. The use of a common lexicon will enable the creation of a regional threats database that can help identify the most severe, pervasive or ubiquitous threats in the northeast. Such a database will foster efforts to address regional conservation needs and collaboration among states, which can pool their resources and expertise to maximize conservation gain.

The common threats lexicon for the Northeastern states follows the International Union for the Conservation of Nature's (IUCN) threats classification scheme. The IUCN lexicon consists of 11 primary categories of threats, which are then subdivided into secondary and tertiary sub-categories of increasing detail. In using the IUCN lexicon to identify threats in its Wildlife Action Plan, New Jersey will derive all the benefits discussed above. Users of the plan should note, however, that in deferring to a standard (and - in this case - "international") lexicon as the

standard framework within which to categorize threats, there will be some inherent shortcomings. For example, the DFW decided not to use the IUCN's "Geological Events" category because they were highly unlikely to affect the state's wildlife (it included, for example earthquakes, tsunamis, avalanches, and landslides). In addition, many second or third level IUCN threat categories were retained, despite perhaps having only minor relevance to New Jersey's SGCN. Certain "scale" modifiers contained in the IUCN lexicon were also poorly defined or perhaps not applicable in New Jersey. These factors need to be understood and considered when reviewing the threats identified in this Plan.

Threats can also be viewed as factors that drive the need for conservation action. Therefore, the Northeastern states also considered the "action drivers" identified by the U.S. Fish & Wildlife Service in their Tracking and Reporting on Actions for Conservation of Species (TRACS) database as a meaningful way to expand the IUCN threat categories. Through this assessment, the DFW added three TRACS action-driver categories to the 10 IUCN primary threats categories: "Resource Management Needs" and "Education & Outreach Needs." The 13 resulting threat and action driver categories are summarized in Table 2, and throughout the remainder of the plan are simply referred to as "threats."

Table 2. Major Threats & Action-Driver Categories

The numbers below relate to those in the IUCN and TRACS lexicons, so are not sequential. Categories 1-9 and 11 are threats based on the IUCN Lexicon, while categories 12, 14, and 15 are action drivers based on the TRACS Lexicon.

Category	Threat/Action Driver
1	Residential & Commercial Development
2	Agriculture & Aquaculture
3	Energy Production & Mining
4	Transportation & Service Corridors
5	Biological Resource Use
6	Human Intrusions and Disturbance
7	Natural Systems Modifications
8	Invasive & Other Problematic Species, Genes, & Diseases
9	Pollution
11	Climate Change & Severe Weather
12	Resource Management Needs
14	Education & Outreach Needs
15	Administrative Needs

The DFW worked with conservation partners and wildlife experts to organize finer scale threats into each of the 13 major categories. The resulting hierarchy organizes threats into four tiered levels of increasing detail, with level 4 containing New Jersey-specific threats to further clarify how the IUCN and TRACS categories apply specifically to New Jersey's wildlife and habitats.

A final note about "threats": The primary purpose of New Jersey's state Wildlife Action Plan is to identify the *actions* that must be taken to conserve *any one* of the 107 focal species or species groups addressed in the Plan. In order to identify such actions, it is necessary to identify the *specific threats* to each of these individual species or species groups. Threats to any single wildlife species vary greatly, and it is important to understand that activities, events or conditions that serve as a "threat" to one species or species group could benefit, or serve as a "conservation action," for another. For example, "forestry activities" may be listed as a threat when considered in the context of potential impacts associated with poorly timed or implemented forestry practices, or in regard to retention of certain forest structure or condition necessary for an individual focal species. However, forestry activities are more often a critically important *action* necessary to ensure that a broad array of other focal species or species groups are supported by a healthy and diverse age class of forest habitats, have specific vegetative species available, or experience specific conditions in the sub-canopy or forest floor that are critical for their survival. To arrive at all meaningful actions, it is important that all activities, events or conditions that can adversely impact certain wildlife species be recognized as threats. But it is equally important that users of the plan understand these characterizations are relative to some specific combination of species/habitats/conservation issues. Switching the focus to a separate species, habitat context, or conservation issue may, in turn, *completely* alter an activity, event or condition's characterization as a "threat."

In a similar vein, certain activities, events or conditions perceived as being beneficial or necessary for *society* may also be characterized in the Wildlife Action Plan as a "threat." For example, "agriculture and aquaculture" are identified as an IUCN threat category. Here, the plan merely recognizes that – *for specific species or species groups, and perhaps even limited to particular habitats or regions of the State* – these activities, conditions or associated side effects, do in fact result in adverse impacts for that specific species, their habitats or life history needs. Designation as a "threat" does *not* imply that these activities are universally adverse to all wildlife, nor that they are bad for humankind. Designation of activities, events or conditions as "threats" has no derogatory intent -- it merely reflects some factual association with impacts to certain wildlife species or habitats. Again, "threats" (and "actions") must be considered and understood in the context of specific species or species groups, and/or a specific habitat, and/or a specific conservation concern.

B. Evaluation of Threats

Using the 107 Focal SGCN as representatives of New Jersey's wildlife, DFW teams of taxa experts assessed how each of the threats related specifically to each species. They used a qualitative, expert-opinion-based approach that considered six threat characteristics[5] for each Focal SGCN: severity, reversibility, immediacy, spatial extent, certainty, and likelihood of impact in the next 10 years. These characteristics were used to assign a summary impact rating for each of the

[5] Crisfield, E. and the Northeast Fish and Wildlife Diversity Technical Committee (NEFWDTC). 2013

Focal SGCN: "high (3)," "moderate (2)," or "low (1)." A rating of "not applicable (0)" was given if the category posed no or an insignificant threat to the species. These ratings were then used to identify the threats that required immediate or near-term conservation actions. This information was used to generate the report, *Threats to and Conservation Actions for the Focal Species of Greatest Conservation Need* (which is further described in Section III of this chapter and is presented in Appendix J). The ratings were further used to identify the conservation actions that will have the greatest impact on wildlife in the next 10 years, as described in Section II below.

C. Threats Summary

After rating the threats to each Focal SGCN, the DFW grouped the Focal SGCN into three categories: marine (with 10 species), non-marine aquatic (with 25 species), and terrestrial (with 72 species). Then, for each level-3 threat category, the DFW determined the "threat frequency" (percentage of species within each of the three groups for which the threat category applied) and "threat severity" (the average impact rating for those species to which the threat category applied). A set of parameters were used for each group to refine the list of threats to those of greatest concern.[6] This distillation resulted in the 68 threat categories presented in Table 3.

6

- Marine Group: Threat frequency ≥90% of species with average threat severity ≥1.5 or average Threat severity score ≥2.5
- Non-marine aquatic group: Threat frequency ≥90% of species with average threat severity ≥1.5 or average Threat severity score ≥2.5
- Terrestrial group: Threat frequency ≥80%* of species with average threat severity ≥1.5 or average Threat severity score ≥2.5

*A lower threat frequency value was applied to the terrestrial group as the group contains multiple species guilds with more varied life history requirements and consequently more varied threats and action drivers.

Table 3. Summary of the most ubiquitous and severe threats to New Jersey's wildlife and their habitats.

IUCN Level3 ID	IUCN Level 3 Category	IUCN Level 3 Category Definition/Description	Actions: TRACS Level3 ID
1.1.1	Land conversion from natural habitat to urban and other residential areas (large and small scale)	Habitat loss, fragmentation, and degradation (including wildlife travel corridors) associated with habitat conversion to housing and associated infrastructure and traffic.	1.2.1, 2.9.2, 2.10.0, 2.11.0, 2.12.1, 2.12.2, 2.12.3, 2.12.7, 3.0.0, 3.2.0, 3.2.3, 3.3.1, 3.3.2, 3.5.3, 3.5.4, 4.1.0, 6.0.0, 6.1.1, 6.3.0, 7.1.4, 8.1.0, 8.3.0, 9.1.0, 9.3.1, 9.3.3, 11.1.1, 11.1.2, 11.2.0, 11.2.1, 100.1.3, 100.1.4, 100.1.5, 100.3.0, 100.3.2, 100.4.0
1.2.1	Land conversion from natural habitat to commercial or industrial areas (large and small scale)	Habitat loss, fragmentation, and degradation (including wildlife travel corridors) resulting from habitat conversion to commercial or industrial use and associated infrastructure and traffic (Note: The conversion of natural landscapes to structures and infrastructure within military bases are included within this category).	1.2.1, 2.9.2, 2.10.0, 2.11.0, 2.12.1, 2.12.2, 2.12.3, 2.12.7, 3.0.0, 3.2.0, 3.2.3, 3.3.1, 3.3.2, 3.5.3, 3.5.4, 4.1.0, 6.0.0, 6.1.1, 6.3.0, 7.1.4, 8.1.0, 8.3.0, 9.1.0, 9.3.1, 9.3.3, 11.1.1, 11.1.2, 11.2.0, 11.2.1, 100.1.3, 100.1.4, 100.1.5, 100.3.0, 100.3.2, 100.4.0
2.1.1	Shifting Agriculture	Changing the agricultural use of a land from one that can be beneficial to animals (e.g., hay fields, pastureland) if managed for target species to one of lesser or no use (e.g., intensive tree/shrub nurseries).	1.2.1, 2.1.1, 2.3.3, 2.9.1, 2.10.0, 2.11.0, 2.12.1, 2.12.2, 2.12.3, 2.12.7, 3.0.0, 3.3.1, 3.3.2, 3.5.3, 3.5.4, 4.1.0, 6.0.0, 6.3.0, 6.4.0, 7.1.2, 7.1.4, 8.1.0, 8.3.0, 9.1.0, 9.3.1, 9.3.3, 11.1.1, 11.1.2, 11.2.0, 11.2.1, 100.1.2, 100.1.3, 100.1.4, 100.1.5, 100.3.0, 100.4.0
2.1.3	Agro-industry	Industrial-scale agriculture, including new or expansion of existing facilities that causes habitat loss, degradation and/or fragmentation.	1.2.1, 2.3.3, 2.9.1, 2.10.0, 2.11.0, 2.12.1, 2.12.2, 2.12.3, 2.12.7, 3.0.0, 3.3.1, 3.3.2, 3.5.3, 3.5.4, 6.0.0, 6.3.0, 6.4.0, 7.1.2, 7.1.4, 8.1.0, 8.3.0, 9.1.0, 9.3.1, 9.3.3, 11.1.1, 11.1.2, 11.2.0, 11.2.1, 11.2.2, 100.1.2, 100.1.3, 100.1.4, 100.1.5, 100.3.0, 100.4.0
3.1.1	Distribution processes of petroleum and other liquid hydrocarbons	Placement of new facilities and pipelines or expansion of existing facilities and pipeline to develop, produce and/or distribute petroleum and other liquid hydrocarbons that causes habitat loss, degradation, and/or fragmentation.	1.2.1, 2.2.1, 2.10.0, 2.11.0, 2.12.1, 2.12.3, 3.0.0, 3.2.0, 3.2.3, 3.3.1, 3.3.2, 3.5.3, 3.5.4, 6.0.0, 6.3.0, 7.1.2, 7.1.4, 8.1.0, 8.3.0, 9.1.0, 9.3.1, 9.3.3, 11.1.1, 11.1.2, 11.2.0, 11.2.1, 100.1.3, 100.1.4, 100.1.5, 100.3.0, 100.4.0
3.1.2	Natural gas distribution processes	Placement of new facilities and pipelines or expansion of existing facilities and pipelines to develop, produce and/or distribute natural gas that causes habitat loss, degradation, and/or fragmentation.	1.2.1, 2.10.0, 2.11.0, 2.12.1, 2.12.3, 3.0.0, 3.2.0, 3.2.3, 3.3.1, 3.3.2, 3.5.3, 3.5.4, 6.0.0, 6.3.0, 7.1.2, 7.1.4, 8.1.0, 8.3.0, 9.1.0, 9.3.1, 9.3.3, 11.1.1, 11.1.2, 11.2.0, 11.2.1, 100.1.3, 100.1.4, 100.1.5, 100.3.0, 100.4.0
3.3.1	Wind Power	Placement of new facilities or expansion of existing facilities that causes habitat loss, degradation, and/or fragmentation and/or that leads to increased bird and bat fatalities within their movement corridors and foraging areas.	1.2.1, 2.10.0, 2.11.0, 2.12.1, 2.12.3, 3.0.0, 3.2.0, 3.3.1, 3.3.2, 3.5.3, 3.5.4, 6.0.0, 6.3.0, 7.1.2, 7.1.4, 8.1.0, 8.3.0, 9.1.0, 9.3.1, 9.3.3, 11.1.1, 11.1.2, 11.2.0, 11.2.1, 100.1.3, 100.1.4, 100.1.5, 100.3.0, 100.4.0
3.4.0	Conventional Power Plants	Placement of new facilities or expansion of existing facilities that causes impacts to groundwater hydrology and/or alters the water temperature and/or pH of aquatic systems.	1.2.1, 2.10.0, 2.10.1, 2.11.0, 2.12.1, 2.12.2, 2.12.3, 2.12.6, 3.0.0, 3.3.1, 3.3.2, 3.5.3, 3.5.4, 6.0.0, 6.3.0, 7.1.2, 7.1.4, 8.1.0, 8.3.0, 9.1.0, 9.3.1, 9.3.3, 11.1.1, 11.2.0, 100.1.3, 100.1.4, 100.1.5, 100.3.0, 100.4.0
4.1.2	Movement of cars and other vehicles on roads and railroads (large and small scale)	Vehicular traffic densities that increase wildlife mortality and disrupt movement corridors.	1.2.1, 2.2.1, 2.10.0, 2.11.0, 2.12.1, 2.12.3, 2.12.7, 3.0.0, 3.2.0, 3.2.3, 3.3.1, 3.5.3, 3.5.4, 6.0.0, 8.1.0, 9.1.0, 9.3.1, 9.3.3, 11.1.1, 11.1.2, 11.2.0, 100.1.4, 100.3.0, 100.4.0

Table 3 (threats/action drivers) continued

IUCN Level3 ID	IUCN Level 3 Category	IUCN Level 3 Category Definition/Description	Actions: TRACS Level3 ID
4.2.2	Management of rights-of-way or communication tower facilities and/or their associated access roads	Managing the vegetation within and adjacent to the rights-of-way, communication tower facilities and/or their associated access roads in a manner that results in direct mortality of wildlife (e.g., mowing during ground-nesting birds' or reptiles nesting season) or the creation of unsuitable habitat or conditions (e.g., herbiciding important food plants for invertebrates).	1.2.1, 2.10.0, 2.11.0, 2.12.1, 2.12.2, 2.12.3, 2.13.0, 3.3.2, 3.5.3, 3.5.4, 6.0.0, 7.1.2, 8.1.0, 8.3.0, 9.1.0, 9.3.1, 9.3.3, 11.1.1, 11.1.2, 11.2.0, 11.2.1, 100.1.3, 100.1.4, 100.1.5, 100.3.0, 100.4.0
4.3.1	Movement of large ships in shipping lanes	Ship traffic densities that increase marine and freshwater species' mortality and/or disrupt movement corridors or migratory patterns.	1.2.1, 3.0.0, 3.3.1, 3.3.2, 3.5.3, 3.5.4, 6.0.0, 6.3.0, 7.1.2, 7.1.3, 7.1.4, 8.1.0, 8.3.0, 9.3.1, 9.3.3, 11.1.1, 11.2.0, 100.1.3, 100.1.4, 100.3.0, 100.4.0
5.1.1	Intentional Use	Excessive or illegal collection of butterflies and other insects, the illegal collection of reptiles and amphibians and localized excessive beaver trapping.	1.2.1, 7.1.2, 7.1.3, 7.1.4, 8.1.0, 8.3.0, 9.3.1, 9.3.3, 100.3.0
5.1.3	Persecution/Control	Harming, killing or controlling the presence of species considered undesirable (e.g., snakes, bats, invertebrates) and similar-looking species (i.e., those species misidentified as an undesirable species).	1.2.1, 7.1.2, 7.1.3, 7.1.4, 8.1.0, 8.3.0, 9.3.1, 9.3.3, 100.3.0
5.4.2	Fishing and Harvesting of Aquatic Resources: Intentional Use (large scale)	Excessive harvest of aquatic animals or plants from public or private "lands" (i.e., aquatic systems) at a large-scale for commercial markets that leads to the loss or degradation of aquatic habitats and/or decline of aquatic species (e.g., excessive horseshoe crab harvest).	1.2.1, 2.2.5, 2.8.0, 2.10.0, 2.10.1, 2.11.0, 2.12.1, 2.12.2, 2.12.3, 2.12.6, 3.0.0, 3.2.0, 3.2.3, 3.3.1, 3.3.2, 3.5.1, 3.5.3, 3.5.4, 4.1.1, 6.3.0, 7.1.2, 7.1.3, 7.1.4, 8.1.0, 8.3.0, 9.1.0, 9.3.1, 9.3.3, 11.1.1, 11.1.2, 11.2.0, 100.1.3, 100.1.4, 100.1.5, 100.3.0, 100.4.0
5.4.3	Fishing and Harvesting of Aquatic Resources: Unintentional effects (subsistence/small scale)	Includes unintended impacts to aquatic animals and/or vegetation as a result of small-scale/subsistence fishing/harvesting practices (e.g., diamond-backed terrapin by-catch within crab traps without excluder devices), the introduction of fishing-gear (e.g., line and hooks) into aquatic systems in which animals become entangled, injured or killed, the disruption of substrate/benthic habitat during trawling activities conducted as a result of product harvesting and/or scientific research.	1.2.1, 2.2.5, 2.8.0, 2.10.0, 2.10.1, 2.11.0, 2.12.1, 2.12.2, 2.12.3, 2.12.6, 3.0.0, 3.2.0, 3.2.3, 3.3.1, 3.3.2, 3.5.1, 3.5.3, 3.5.4, 4.1.1, 6.3.0, 7.1.2, 7.1.3, 7.1.4, 8.1.0, 8.3.0, 9.1.0, 9.3.1, 9.3.3, 11.1.1, 11.1.2, 11.2.0, 100.1.3, 100.1.4, 100.1.5, 100.3.0, 100.4.0
5.4.4	Fishing and Harvesting of Aquatic Resources: Unintentional effects (large scale)	Includes unintended impacts to aquatic animals and/or vegetation as a result of large-scale/commercial fishing/harvesting practices (e.g., diamond-backed terrapin by-catch within crab traps without excluder devices), the introduction of fishing-gear (e.g., abandoned long lines, nets and hooks) into aquatic systems in which animals become entangled, injured or killed, the disruption of substrate/benthic habitat during commercial trawling activities.	1.2.1, 2.2.5, 2.8.0, 2.10.0, 2.10.1, 2.11.0, 2.12.1, 2.12.2, 2.12.3, 2.12.6, 3.0.0, 3.2.0, 3.2.3, 3.3.1, 3.3.2, 3.5.1, 3.5.3, 3.5.4, 4.1.1, 6.3.0, 7.1.2, 7.1.3, 7.1.4, 8.1.0, 8.3.0, 9.1.0, 9.3.1, 9.3.3, 11.1.1, 11.1.2, 11.2.0, 100.1.3, 100.1.4, 100.1.5, 100.3.0, 100.4.0

Table 3 (threats/action drivers) continued

IUCN Level3 ID	IUCN Level 3 Category	IUCN Level 3 Category Definition/Description	Actions: TRACS Level3 ID
6.1.1	Off-road vehicles (motorized and non-motorized)	Vehicle use in natural landscapes that leads to the loss or degradation of habitat and/or aquatic systems and the decline of associated terrestrial and aquatic wildlife through habitat degradation and/or direct mortality (e.g., vehicles driving over dunes or through streams increase erosion and sediment threats degrading the habitat for beach nesting birds and aquatic wildlife, respectively, increase the spread of invasive plants which can alter the natural ecosystem, etc.).	1.2.1, 2.9.1, 2.9.3, 2.10.0, 3.2.0, 3.3.1, 3.5.3, 3.5.4, 5.15.6, 7.1.2, 7.1.3, 7.1.4, 8.1.0, 8.3.0, 9.2.1, 9.3.1, 9.3.3, 11.1.1, 11.2.0, 100.1.4, 100.3.0
6.1.2	Boating	Recreational boating within sensitive wildlife areas that cause the disruption of waterbird colonies, other nesting habitats, or roosting areas.	1.2.1, 2.9.1, 2.9.3, 3.2.0, 3.3.1, 3.5.3, 3.5.4, 7.1.2, 7.1.3, 7.1.4, 8.1.0, 8.3.0, 9.3.1, 9.3.3, 11.1.1, 100.3.0, 100.4.0
6.1.3	Use of beaches	Pedestrian and dog activities within sensitive beach habitats that cause the disruption of nesting, roosting, foraging birds on beaches.	1.2.1, 2.9.1, 2.9.3, 3.3.1, 3.5.3, 3.5.4, 7.1.2, 7.1.3, 7.1.4, 8.1.0, 8.3.0, 9.3.1, 9.3.3, 11.1.1, 11.2.0, 11.2.1, 100.1.4, 100.3.0
6.3.2	Authorized research projects at significant habitats	Includes excessive trampling impacts of rare natural communities, ground-nesting wildlife (birds, reptiles), and aquatic breeders such as amphibians, fish and mussels, and also the impacts of sonar use on marine wildlife.	1.2.1, 3.0.0, 3.3.1, 3.3.2, 3.5.3, 3.5.4, 6.3.0, 7.1.2, 7.1.3, 7.1.4, 8.1.0, 8.3.0, 9.3.1, 9.3.3, 11.1.1, 11.2.0, 100.1.3, 100.1.5, 100.3.0
6.3.3	Other "work" unrelated to research	Includes maintenance and construction activities of structures such as bridges and dams that disturb or otherwise impact wildlife species using the structure to fulfill part of their life history requirements (e.g., breeding, roosting, etc.).	1.2.1, 3.0.0, 3.3.1, 3.3.2, 3.5.3, 3.5.4, 6.3.0, 7.1.2, 7.1.3, 7.1.4, 8.1.0, 8.3.0, 9.3.1, 9.3.3, 11.1.1, 11.2.0, 11.2.1, 100.1.3, 100.1.5, 100.3.0, 100.4.0
7.1.2	Suppression of Fire Frequency/Intensity	Lack of fire in fire-dependent habitats resulting in the degradation or loss of native landscapes and associated wildlife.	1.2.1, 2.3.3, 2.10.0, 2.11.0, 3.0.0, 3.2.0, 3.3.2, 3.5.3, 3.5.4, 6.4.0, 7.1.2, 7.1.4, 8.1.0, 8.3.0, 9.3.1, 9.3.3, 11.1.1, 11.2.0, 11.2.1, 100.1.3, 100.1.4, 100.1.5, 100.3.0, 100.4.0
7.2.1	Abstraction of Surface Water (domestic use)	Includes water diversion for domestic use; ditching, impounding, and stream channelization.	1.2.1, 2.9.1, 2.9.2, 2.10.0, 2.11.0, 2.12.1, 2.12.2, 2.12.3, 2.12.6, 2.12.7, 2.12.8, 2.13.0, 3.0.0, 3.2.0, 3.3.1, 3.3.2, 3.5.3, 3.5.4, 6.4.0, 8.1.0, 9.1.0, 9.3.1, 9.3.3, 11.1.1, 11.1.2, 11.2.0, 100.1.3, 100.1.4, 100.1.5, 100.3.0, 100.4.0
7.2.2	Abstraction of Surface Water (commercial use)	Includes water diversion for commercial use; ditching, impounding, stream channelization.	1.2.1, 2.9.1, 2.9.2, 2.10.0, 2.11.0, 2.12.1, 2.12.2, 2.12.3, 2.12.6, 2.12.7, 2.12.8, 2.13.0, 3.0.0, 3.2.0, 3.3.1, 3.3.2, 3.5.3, 3.5.4, 8.1.0, 9.1.0, 9.3.1, 9.3.3, 11.1.1, 11.1.2, 11.2.0, 100.1.3, 100.1.4, 100.1.5, 100.3.0, 100.4.0
7.2.3	Abstraction of Surface Water (agricultural use)	Includes water diversion for agricultural use; ditching, impounding, stream channelization.	1.2.1, 2.9.1, 2.9.2, 2.10.0, 2.11.0, 2.12.1, 2.12.2, 2.12.3, 2.12.6, 2.12.7, 2.12.8, 2.13.0, 3.0.0, 3.2.0, 3.3.1, 3.3.2, 3.5.3, 3.5.4, 8.1.0, 9.1.0, 9.3.1, 9.3.3, 11.1.1, 11.1.2, 11.2.0, 100.1.3, 100.1.4, 100.1.5, 100.3.0, 100.4.0
7.2.5	Abstraction of Ground Water (domestic use)	Disrupting and/or permanently altering groundwater hydrology in support of the construction of residential developments.	1.2.1, 2.9.2, 2.10.0, 2.11.0, 2.12.1, 2.12.2, 2.12.3, 2.12.5, 2.12.6, 2.12.7, 8.1.0, 9.1.0, 9.3.1, 9.3.3, 11.1.1, 11.1.2, 11.2.0, 100.1.3, 100.1.4, 100.1.5, 100.3.0

Table 3 (threats/action drivers) continued

IUCN Level3 ID	IUCN Level 3 Category	IUCN Level 3 Category Definition/Description	Actions: TRACS Level3 ID
7.2.6	Abstraction of Ground Water (commercial use)	Disrupting and/or permanently altering groundwater hydrology in support of mining operations, hydrofracturing or other commercial activities (excluding development).	1.2.1, 2.9.2, 2.10.0, 2.11.0, 2.12.1, 2.12.2, 2.12.3, 2.12.5, 2.12.6, 2.12.7, 8.1.0, 9.1.0, 9.3.1, 9.3.3, 11.1.1, 11.1.2, 11.2.0, 100.1.3, 100.1.4, 100.1.5, 100.3.0
7.2.7	Abstraction of Ground Water (agricultural use)	Disrupting and/or permanently altering groundwater hydrology as a result of pumping water for irrigation.	1.2.1, 2.9.2, 2.10.0, 2.11.0, 2.12.1, 2.12.2, 2.12.3, 2.12.5, 2.12.6, 2.12.7, 8.1.0, 9.1.0, 9.3.1, 9.3.3, 11.1.1, 11.1.2, 11.2.0, 100.1.3, 100.1.4, 100.1.5, 100.3.0
7.2.9	Small Dams	Altering the physical, biological and chemical environment of streams and rivers as a result of installing small dams and/or conducting periodic dam-associated draw downs. For the purposes of NJ's SWAP, a "small dam" is considered to be any dam similarly defined in New Jersey's Dam Safety Standards, N.J.A.C. 7:20, June 16, 2008, i.e., any dam that impounds <15 acre-feet of water to the top of the dam, has less than 15 ft height of dam, and has a drainage area above the dam of 150 acres or less.	1.2.1, 2.2.5, 3.0.0, 8.1.0, 9.1.0, 9.3.1, 9.3.3, 11.1.1, 11.1.2, 100.3.0
7.2.10	Large Dams	Altering the physical, biological and chemical environment of streams and rivers as a result of installing large dams and/or conducting periodic dam-associated draw downs. For the purpose of NJ's SWAP, a "large" dam" is considered to be any dam greater in structure size, volume of water retention or size drainage area above the dam than would otherwise meet the definition of a "small dam" used herein (and as is similarly defined at N.J.A.C. 7:20, Dam Safety Standards, June 16, 2008).	1.2.1, 2.2.5, 3.0.0, 8.1.0, 9.1.0, 9.3.1, 9.3.3, 11.1.1, 11.1.2, 100.3.0
7.2.11	Dams (size unknown)	Altering the physical, biological and chemical environment of streams and rivers as a result of installing dams (of a size that does not qualify as "small" or "large") and/or conducting periodic dam-associated draw downs.	1.2.1, 2.2.5, 3.0.0, 8.1.0, 9.1.0, 9.3.1, 9.3.3, 11.1.1, 11.1.2, 100.3.0
7.2.12	Culverts	Placement or improper management of culverts that create barriers to terrestrial and/or aquatic organisms rather than assist their safe dispersal.	1.2.1, 2.2.1, 2.2.5, 2.9.2, 3.0.0, 8.1.0, 9.1.0, 9.3.1, 9.3.3, 11.1.1, 11.1.2, 11.2.0, 100.1.3, 100.1.4, 100.1.5, 100.3.0, 100.4.0
7.2.13	Stream Burial	Loss of headwater and/or intermittent streams as a result of stream burial.	1.2.1, 8.1.0, 9.1.0, 9.3.1, 9.3.3, 11.1.1, 11.1.2, 11.2.0, 100.1.3, 100.1.4, 100.1.5, 100.3.0
7.3.1	Shoreline Stabilization	Installation of rip-rap, jetties, bulkheads, groins, etc. that alters the behavior of or otherwise impacts beach and marine wildlife. Installation of rip-rap, gabion and bulkheads on freshwater lakes and streams impacting freshwater aquatic and semi-aquatic species.	1.2.1, 2.1.1, 2.6.6, 2.9.1, 2.9.2, 2.9.3, 2.12.2, 3.3.1, 3.3.2, 4.1.1, 7.1.2, 8.1.0, 8.3.0, 9.3.1, 9.3.3, 11.1.1, 11.2.0, 11.2.1, 100.3.0
7.3.2	Inappropriate timing of mowing	Managing roadsides, rights-of-way, hay and other fields, etc. through mowing at times that increase the risk of disturbance and/or direct mortality to ground nesting/breeding birds, reptiles, small mammals and invertebrates.	1.2.1, 2.10.0, 2.11.0, 3.3.2, 3.5.3, 4.1.0, 6.0.0, 6.3.0, 7.1.2, 8.1.0, 8.3.0, 9.1.0, 9.3.1, 9.3.3, 11.1.1, 11.1.2, 11.2.0, 11.2.1, 11.2.2, 100.1.2, 100.1.3, 100.1.4, 100.1.5, 100.3.0, 100.4.0

Table 3 (threats/action drivers) continued

IUCN Level3 ID	IUCN Level 3 Category	IUCN Level 3 Category Definition/Description	Actions: TRACS Level3 ID
7.3.3	Removal of coarse woody debris (streams, forests, scrub-shrub habitats)	Removing woody debris that could otherwise provide shelter, nesting and foraging habitat for birds, reptiles and amphibians, and small mammals.	1.2.1, 2.3.2, 2.10.0, 2.11.0, 3.2.0, 3.3.2, 3.5.3, 4.1.0, 6.0.0, 6.3.0, 6.4.0, 8.1.0, 8.3.0, 9.1.0, 9.3.1, 9.3.3, 11.1.1, 11.1.2, 11.2.0, 11.2.1, 11.2.2, 100.1.3, 100.1.4, 100.1.5, 100.3.0, 100.4.0
7.3.5	Poor habitat management	Managing habitats and aquatic systems in a manner that is not beneficial to, and may cause harm and/decline of, the wildlife inhabitants and/or native plant communities.	1.2.1, 2.1.1, 2.3.2, 2.3.3, 2.8.0, 2.9.1, 2.9.3, 2.10.0, 2.10.1, 2.11.0, 2.12.1, 2.12.2, 2.12.3, 2.12.5, 2.12.6, 2.12.7, 2.12.8, 3.0.0, 3.2.0, 3.2.3, 3.3.1, 3.3.2, 3.5.3, 3.5.4, 4.1.0, 6.0.0, 6.3.0, 6.4.0, 8.1.0, 8.3.0, 9.1.0, 9.3.1, 9.3.3, 11.1.1, 11.1.2, 11.2.0, 11.2.1, 11.2.2, 100.1.2, 100.1.3, 100.1.4, 100.1.5, 100.3.0, 100.4.0
8.1.4	Invasive non-native terrestrial/wetland animals	Non-native, terrestrial and/or wetland-associated animals that have a detrimental impact on the natural ecosystem by damaging or causing change in the native vegetation (and potential food source), hydrology and/or a decline of native aquatic animals. Examples include feral cats, gypsy moth, Asian long-horned beetle (Anoplophora glabripennis), emerald ash borer (Agrilus planipennis), and hemlock wooly adelgid (Adelges tsugae), European starlings (Sturnus vulgaris) and house wrens.	1.2.1, 2.8.0, 2.13.0, 3.2.0, 3.3.1, 3.3.2, 3.5.4, 7.1.4, 8.1.0, 8.3.0, 9.3.1, 9.3.3, 11.1.1, 11.2.0, 100.1.3, 100.1.4, 100.1.5, 100.3.0, 100.4.0
8.1.6	Invasive non-native fungal/bacterial diseases	Non-native fungal and bacterial diseases that infect and have a detrimental impact on native wildlife and/or their habitats. Examples of such diseases include chytrid fungus (Batrachochytrium dendrobatidis) and Pseudogymnoascus destructans which causes white-nose syndrome in bats, and Sudden Oak Death fungus (Phytophthora ramorum).	1.2.1, 2.8.0, 2.13.0, 2.14.0, 3.2.0, 3.3.1, 3.5.3, 3.5.4, 8.1.0, 8.3.0, 9.3.1, 9.3.3, 11.1.1, 100.1.3, 100.1.5, 100.3.0, 100.4.0
8.3.0	Introduced Genetic Material	Human-induced hybridization or genetic dilution through direct introduction of species from another region or indirect introduction from habitat modification creating habitat connectivity that naturally would not have occurred otherwise.	1.2.1, 2.13.0, 3.0.0, 3.2.0, 3.2.3, 3.2.5, 3.5.4, 8.1.0, 9.3.1, 9.3.3, 100.1.5, 100.3.0, 100.4.0
8.5.2	Named Species (Disease)	Includes West Nile Virus, arenavirus, sudden oak death, Avian Influenza.	1.2.1, 2.8.0, 2.13.0, 2.14.0, 3.2.0, 3.3.1, 3.5.3, 3.5.4, 8.1.0, 9.3.1, 9.3.3, 11.1.1, 100.1.3, 100.1.5, 100.3.0, 100.4.0
9.1.1	Sewage	Habitat is degraded and/or animals are harmed or killed as a result of leaking septic systems, discharge from municipal wastewater treatment plants, untreated sewage.	1.2.1, 2.10.0, 2.11.0, 3.0.0, 3.2.0, 3.3.1, 3.3.2, 3.5.3, 3.5.4, 7.1.4, 8.1.0, 9.3.1, 9.3.3, 11.2.0, 100.1.3, 100.1.4, 100.3.0, 100.4.0
9.1.2	Run-off	Habitat is degraded and/or animals are harmed or killed as a result of runoff of oil and sediment from roads, chemicals from roads and lawns, road salt, golf course chemicals, etc. into adjacent aquatic and terrestrial habitats.	1.2.1, 2.8.0, 2.10.0, 2.11.0, 3.0.0, 3.2.0, 3.3.1, 3.3.2, 3.5.3, 3.5.4, 7.1.4, 8.1.0, 8.3.0, 9.1.0, 9.3.1, 9.3.3, 11.2.0, 100.1.3, 100.1.4, 100.3.0, 100.4.0

Table 3 (threats/action drivers) continued

IUCN Level3 ID	IUCN Level 3 Category	IUCN Level 3 Category Definition/Description	Actions: TRACS Level3 ID
9.2.1	Oil Spills	Habitat is degraded and/or animals are harmed or killed as a result of terrestrial and aquatic leakage from fuel tanks and spills from pipelines, and from PCBs in river sediments and the subsequent impacts of bioaccumulation of PCBs in the food web.	1.2.1, 2.10.0, 2.11.0, 3.3.2, 3.5.3, 8.1.0, 9.1.0, 9.3.1, 9.3.3, 11.1.1, 100.3.0, 100.4.0
9.2.2	Seepage from Mining	Includes acid mine drainage, mine tailings.	1.2.1, 2.10.0, 2.11.0, 3.0.0, 3.2.0, 3.3.1, 3.3.2, 3.5.3, 3.5.4, 7.1.4, 8.1.0, 9.3.1, 9.3.3, 100.1.3, 100.3.0
9.2.3	Industrial and Military Effluents: Other	Other industrial pollutants impacting habitat and/or animals which are not specifically captured under the classification scheme such as toxic chemicals from factories, illegal dumping of chemicals, other industrial effluent, ship waste discharge, etc.	1.2.1, 2.10.0, 2.11.0, 3.0.0, 3.2.0, 3.3.1, 3.3.2, 3.5.3, 3.5.4, 7.1.4, 8.1.0, 9.3.1, 9.3.3, 100.1.3, 100.3.0
9.3.1	Nutrient Loads	Aquatic and terrestrial environments become degraded or destroyed and/or animals are harmed as a result of nutrient loading from fertilizer run-off, manure from feedlots, nutrients from aquaculture, etc.	1.2.1, 2.10.0, 2.11.0, 3.0.0, 3.2.0, 3.3.1, 3.3.2, 3.5.3, 3.5.4, 7.1.4, 8.1.0, 8.3.0, 9.1.0, 9.3.1, 9.3.3, 11.1.2, 11.2.0, 100.1.3, 100.1.4, 100.1.5, 100.3.0, 100.4.0
9.3.2	Soil Erosion and Sedimentation	Aquatic and terrestrial environments become degraded or destroyed and/or animals are harmed as a result of soil erosion from overgrazing, increased run-off and hence sedimentation due to the conversion of forests (or other natural landscapes) to agricultural lands, etc.	1.2.1, 2.9.2, 2.10.0, 2.11.0, 2.12.1, 2.12.3, 2.12.7, 3.0.0, 3.2.0, 3.3.2, 3.5.1, 3.5.3, 3.5.4, 8.1.0, 8.3.0, 9.1.0, 9.3.1, 9.3.3, 11.2.0, 100.1.4, 100.3.0, 100.4.0
9.3.3	Herbicides and Pesticides	Herbicide, pesticides and fertilizer run-off from agricultural fields degrade or destroy adjacent aquatic and terrestrial habitats and/or cause harm to non-target species (plants and animals).	1.2.1, 2.8.0, 2.10.0, 2.11.0, 2.12.1, 2.12.3, 2.12.7, 3.0.0, 3.2.0, 3.3.2, 3.5.1, 3.5.3, 3.5.4, 8.1.0, 8.3.0, 9.1.0, 9.3.1, 9.3.3, 11.2.0, 100.1.4, 100.3.0, 100.4.0
9.3.4	Agricultural and Forestry Effluents: Other	Other agricultural and/or forestry management-related pollutants impacting habitat and/or animals which are not specifically captured under the classification scheme; identify type/source.	1.2.1, 2.10.0, 2.11.0, 2.12.1, 2.12.3, 2.12.7, 3.0.0, 3.2.0, 3.3.2, 3.5.1, 3.5.3, 3.5.4, 8.1.0, 8.3.0, 9.1.0, 9.3.1, 9.3.3, 11.2.0, 100.1.4, 100.3.0, 100.4.0
9.3.5	Control of insect pests and plants leading to mortality of non-target species not associated with agriculture	Herbicide and pesticides applied in environments through directional application (i.e., not aerial spraying) that lead to the harm of non-target species (plants and animals) such as the use of larvacides and adulticides for mosquito control that may harm amphibians and beneficial invertebrates.	1.2.1, 2.8.0, 2.11.0, 2.13.0, 3.2.0, 3.3.2, 3.5.3, 8.1.0, 8.3.0, 9.1.0, 9.3.1, 9.3.3, 11.2.0, 100.1.4, 100.3.0, 100.4.0
9.4.1	Direct hazards to wildlife	Includes waste that can harm or kill wildlife by entangling or strangling animals leading to their predation, starvation or fatal injury, causing fatal blockages in their digestive systems when waste is mistakenly eaten, etc., including but not limited to municipal solid waste, litter from cars and boats, waste that entangles or strangles wildlife, construction debris, etc.	1.2.1, 8.1.0, 8.3.0, 9.3.1, 9.3.3, 11.2.0, 100.1.4, 100.3.0, 100.4.0

Table 3 (threats/action drivers) continued

IUCN Level3 ID	IUCN Level 3 Category	IUCN Level 3 Category Definition/Description	Actions: TRACS Level3 ID
9.5.1	Acid Rain	Habitat and water quality degradation and/or the acidification of ocean water as a result of acid rain, excess nitrogen deposition, wind dispersion of pollutants or sediments, radioactive fallout, smoke from forest fires, etc.	1.2.1, 8.1.0, 9.3.1, 9.3.3, 100.3.0
9.5.6	Herbicides and Pesticides	Herbicide and pesticides applied to environments through aerial application that lead to the harm of non-target species (plants and animals) such as the aerial application of chemicals to control pests, such as gypsy moths, mosquitos.	1.2.1, 2.8.0, 3.0.0, 3.3.2, 3.5.3, 8.1.0, 9.3.1, 9.3.3, 100.3.0
9.6.3	Noise Pollution	Noise that causes changes in animal behavior that may result in injury, death, failed reproduction, or detrimental shifts in migratory patterns such as noise from highways or airplanes, sonar from submarines that disturb whales, the construction activities associated with offshore wind and other energy development, etc.	1.2.1, 3.2.0, 3.3.1, 3.5.3, 3.5.4, 5.15.6, 7.1.2, 7.1.3, 7.1.4, 8.1.0, 8.3.0, 9.2.1, 9.3.1, 9.3.3, 11.1.1, 11.2.0, 11.2.1, 100.1.4, 100.3.0
11.1.0	Macro- and Micro-Climate Alterations	Permanent changes in macro- and micro-habitat conditions that reduce habitat suitability for habitat specialist or niche species.	1.2.1, 2.1.1, 2.9.1, 2.9.3, 2.10.0, 2.11.0, 2.12.1, 2.12.2, 2.12.3, 2.12.6, 2.12.7, 3.0.0, 3.2.0, 3.3.1, 3.5.3, 4.1.1, 6.0.0, 8.1.0, 9.3.1, 9.3.3, 100.3.0
11.2.1	Droughts	Increased periods and/or frequency of droughts leading to changes in the hydrology of aquatic systems and ground water and subsequent loss/alteration of aquatic and terrestrial habitats, the elimination of small wetlands and streams, etc., and subsequent impacts or loss of animals dependent on such habitat such as freshwater mussels.	1.2.1, 2.10.0, 2.11.0, 2.12.1, 2.12.2, 2.12.3, 2.12.5, 2.12.6, 2.12.7, 3.0.0, 3.3.1, 3.5.3, 3.5.4, 4.1.1, 6.0.0, 6.3.0, 7.1.4, 8.1.0, 9.3.1, 9.3.3, 11.2.0, 100.1.4, 100.3.0
11.3.1	Temperature extremes	Periods of extreme temperature ranges (high or low) that lead to the loss of habitats, disrupts migratory patterns of both marine and terrestrial wildlife, reduces water flow in streams/rivers, increases water temperature and/or changes water pH which impacts aquatic animals, lowers the water level of wetlands, riverine, lacustrine and vernal pool habitats, and causes premature drying of vernal habitats.	1.2.1, 2.10.0, 2.11.0, 2.12.1, 2.12.2, 2.12.3, 2.12.5, 2.12.6, 2.12.7, 3.0.0, 3.3.1, 3.5.3, 3.5.4, 4.1.1, 6.0.0, 6.3.0, 7.1.4, 8.1.0, 9.3.1, 9.3.3, 11.2.0, 100.1.4, 100.3.0
11.4.1	Storms and flooding	Extreme flooding alters the hydrology of aquatic habitats and causes water quality degradation as a result of increased silt loads, stream bottom shifting and increased turbidity of streams and rivers. It also disrupts migratory patterns of both marine and terrestrial wildlife, and coastal flooding breaches existing natural sand berms along shores that normally limit tidal flooding events and cause conversion of "barrier wetlands" to open water or other natural communities.	1.2.1, 2.9.1, 2.9.2, 2.9.3, 2.10.0, 2.11.0, 2.12.1, 2.12.2, 2.12.3, 2.12.5, 2.12.6, 2.12.7, 3.0.0, 3.3.1, 3.5.3, 3.5.4, 4.1.1, 6.0.0, 6.1.1, 6.3.0, 7.1.4, 8.1.0, 8.3.0, 9.1.0, 9.3.1, 9.3.3, 11.2.0, 100.1.4, 100.3.0, 100.3.2

Table 3 (threats/action drivers) continued

IUCN Level3 ID	IUCN Level 3 Category	IUCN Level 3 Category Definition/Description	Actions: TRACS Level3 ID
11.6.3	Phenology shifts related to species redistribution	Changes in species distribution driven by climate-caused changes in species' ranges and/or competition.	1.2.1, 2.8.0, 2.13.0, 3.0.0, 3.2.0, 3.2.3, 3.2.5, 3.3.1, 3.3.2, 3.5.3, 3.5.4, 4.1.1, 8.1.0, 8.3.0, 9.3.1, 9.3.3, 11.2.0, 100.1.5, 100.3.0, 100.4.0
12.1.1	Resource information collection needs: Lack of initial baseline inventory	Need to gather baseline data regarding fish, wildlife populations and/or habitat status, availability and condition as part of long-term trend analysis.	1.2.1, 2.8.0, 2.13.0, 3.0.0, 3.2.0, 3.2.3, 3.3.1, 3.3.2, 3.5.3, 3.5.4, 8.1.0, 9.3.1, 9.3.3, 100.1.3, 100.3.0, 100.4.0
12.1.2	Resource information collection needs: Lack of up-to-date existing information	Need to conduct (routine, regular, ongoing) surveys/assessments to provide the up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.	1.2.1, 2.8.0, 2.14.0, 3.0.0, 3.2.0, 3.2.1, 3.2.2, 3.3.1, 3.3.2, 3.5.3, 3.5.4, 8.1.0, 9.3.1, 9.3.3, 100.3.0, 100.4.0
12.1.3	Resource information collection needs: Need to answer research question	Need to address unanswered or unresolved conservation question(s) regarding fish/wildlife species, species suites and/or their habitats that will inform future conservation efforts and management decisions.	1.2.1, 2.4.2, 2.8.0, 2.13.0, 2.14.0, 3.0.0, 3.2.0, 3.2.3, 3.2.4, 3.2.5, 3.2.7, 3.3.1, 3.3.2, 3.5.1, 3.5.3, 3.5.4, 6.3.0, 8.1.0, 9.3.1, 9.3.3, 100.1.3, 100.3.0, 100.4.0
12.1.4	Resource information collection needs: Need to develop new technique	Need to develop and evaluate new species or habitat survey methods or techniques because current survey/assessment efforts fail to obtain the necessary data. Need to develop and evaluate new (species or habitat) management techniques.	1.2.1, 3.2.0, 3.3.1, 3.3.2, 3.5.3, 3.5.4, 8.1.0, 9.3.1, 100.3.0
12.3.0	State Regulatory Reforms		1.2.1, 2.2.1, 2.10.0, 3.2.0, 3.3.1, 3.3.2, 3.5.3, 3.5.4, 6.0.0, 6.1.1, 6.3.0, 6.4.0, 7.1.2, 7.1.3, 7.1.4, 8.1.0, 9.1.0, 9.2.1, 9.3.1, 9.3.3, 11.1.1, 11.1.2, 11.2.0, 100.1.2, 100.1.3, 100.1.4, 100.1.5, 100.3.0, 100.3.2, 100.4.0
14.1.1	Education needs: Need for improved knowledge of fish and wildlife and their habitats	Lack of general knowledge or understanding (ecological literacy) of fish and wildlife and habitat conservation.	1.2.1, 3.3.1, 4.1.0, 4.1.1, 5.15.6, 8.1.0, 8.3.0, 9.2.1, 9.3.1, 11.2.0, 11.2.1, 11.2.2, 100.1.5, 100.3.0, 100.4.0
14.2.1	Outreach needs: Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions	Need to develop greater understanding of and support for agency's/organization's conservation work among general public and constituent groups (i.e., conservation partners, government agencies, the general public, farmers, business, homeowners, recreationists).	1.2.1, 3.3.1, 3.5.4, 4.1.0, 4.1.1, 5.15.6, 8.1.0, 8.2.3, 8.3.0, 9.1.0, 9.2.1, 9.3.1, 9.3.3, 11.2.0, 11.2.1, 11.2.2, 100.1.5, 100.3.0, 100.4.0
15.2.3	Need for multi-state, regional and landscape scale planning	Needs that can only be achieved via coordination or action among states or regional conservation partners/stakeholders.	9.3.1

D. Future Evaluation and Ranking of Threats

The DFW intends to work with conservation partners to further evaluate threats from 2018 to 2020, so as new information and perspectives are assessed, these values, and consequently the lists, may change. Future evaluations of threats will consider the six threat characteristics independently (such as their severity, spatial extent, and tractability) with the goal of generating rankings that even more accurately represent the potential risk to Focal SGCN. The results of this intensive evaluation will be integrated into a revised report, *Threats and Actions of Focal Species of Greatest Conservation Need*, as part of a future revision to this plan.

E. The Compounding Threat of Climate Change

Consideration of the implications of climate change for SGCN is a requirement that the USFWS places on all State Wildlife Action Plan submittals. Further, climate change – perhaps more than any other threat – exacerbates the consequences of many other threats in addition to posing direct problems of its own. This section therefore discusses the current state and projections of climate change in New Jersey.

The current state of climate change in New Jersey

- In New Jersey, the average annual temperature has continued to rise over the past century. Climate data for a 122-year period between 1895 and 2016, published by the State Climatologist Office, Rutgers University, demonstrates a clear statewide warming trend. Notably, the five of the coldest average annual temperatures were recorded before 1941, while the five warmest were recorded after 1997.[7]
- While precipitation has been variable over the past century, New Jersey's average annual precipitation in the past four decades has exceeded that of the early 20th century.[8]
- Complex modeling led by Rutgers University indicates that sea level rise in the 20th century has been three times faster than at any time in the past 2,700 years.[9]
- Over the last 15 years, sea level rose, on average, 2" globally and 4" in New Jersey. Over the next 15 years, sea level is predicted to rise 3"-4" globally and 7"-12" in New Jersey. If greenhouse gas emissions remain the same, sea level could rise 24"-36" globally over the next century and 29"-54" along the New Jersey coast. If emissions are cut drastically, the century prediction could be reduced by 12" or so – meaning that New Jersey will have to contend with significant sea level rise even if changes were made immediately.[10]
- New Jersey's marshes are relatively flat, so 12" of sea level rise translates to the marsh moving 1,000' back. The Delaware Bay coast of New Jersey is especially vulnerable. At current rates, New Jersey will lose almost 3% of its landmass over the course of the next century to advancing waters.[11]
- The sea level rise trend for New Jersey is almost twice the global rate.[12]
- Increasing rates of carbon dioxide emissions (and the subsequent absorption of the carbon dioxide into the water) is leading to ocean acidification. The average pH has gone down by 0.1 since the Industrial Revolution. This represents a 25% change, and an even larger change is predicted in the next 10-50 years.[13]

---

[7] Office of the NJ State Climatologist, 2016
[8] Broccoli *et al*, 2013
[9] Kopp *et al*, 2016
[10] Kopp et al., 2014
[11] Cooper et al., 2008
[12] Kopp et al., 2014
[13] NJCAA, 2014a

Future effects of climate change if climate change continues to accelerate

- Decreased air and water quality.[14]
- More severe "heat island" effects in New Jersey's urbanized landscapes.[15]
- Changes in forest species composition, with resulting shifts or losses of bird and wildlife habitat, migratory corridors and breeding areas.[16]
- More severe storms separated by increased periods of drought. This flashier storm cycle will result in more severe flooding, but also in less recharge of aquifers as storm water quickly runs off the hardened soils. These changes will increase stress on both natural and managed ecosystems across the state.[17]
- Substantial increases in the extent and frequency of storm surge, coastal flooding, erosion, property damage, and loss of wetlands along New Jersey's densely populated coasts. Sea level rise will exacerbate these problems.[18]
- Increased salt-water inundation into coastal aquifers that residents rely on for fresh water.[19]

Implications of climate change for New Jersey's wildlife and their habitats

- Loss of habitat as marshes and beaches disappear due to sea-level rise. If storms occur during breeding seasons, productivity could be reduced by more flooding and damaging winds. Conversely, overwash habitat can be created by major storms like hurricanes, but then compromised when humans attempt to re-stabilize an area, thus eliminating the positive benefit it would have had for some wildlife.[20]
- Diminished water recharge within watersheds could lead to decreased water availability for native vegetation, with consequent impacts on habitats and wildlife.[21]
- Shifts in the timing of migration and hibernation could put these critical life history events out of synch with the availability of important food resources, leading to mistimed reproduction and reduced population success.[22] For example, warmer springs have led to earlier nesting for 28 migrating bird species on the East Coast.[23]

[14] NOAA 2017
[15] Hoverter, 2012
[16] Pinchot Institute for Conservation, 2015; U.S.D.A. Forest Services, 2016.
[17] Sweet, *et al*, 2013
[18] USGCRP, 2009
[19] NJCAA, 2014b
[20] NWF and Manomet, 2014
[21] VanLuven, 2015
[22] Stenseth and Mysterud, 2002; Visser *et al*, 2004; Visser and Both, 2005
[23] Butler, 2003

- Increased periods of drought will lower water tables, altering wetlands that are critical for many of New Jersey's wildlife species that rely on them year-round or seasonally for resting, breeding, and feeding.[24]
- Warmer winter temperatures may result in an increase of invasive pathogens and insects that threaten the state's natural systems as many of these organisms are limited by cold winters. There are many cases where climate change has already affected or will affect forest-insect species' range and abundance.[25] Warming temperatures are expected to result in an expansion of suitable range and increase the probability of spruce beetle outbreaks.[26] Climate change also appears to be encouraging the expansion of other non-native insects, including hemlock wooly adelgid, gypsy moth, and southern pine beetle.[27] Research has also demonstrated the spread of two protozoan parasites from the Gulf of Mexico to Delaware Bay and farther north, resulting in mass mortalities of oysters.[28]
- Warming trends lead to changes in species compositions. In the ocean, for example, hake was once one of the most common fish species off New Jersey's coast. It has been replaced by black sea bass, which used to be most common off Virginia's coast.[29]
- Increasing amounts of carbon dioxide absorbed in the water leads to ocean acidification (lower pH) which changes nutrient availability, decreases oxygen levels, and impedes the ability of shellfish to thrive and grow strong shells.[30]

II. Conservation Actions for Wildlife and Their Habitats

A. Building a Common Lexicon to Enhance Local and Regional Actions

For the 2006 Plan, the DFW and conservation partners identified hundreds of conservation actions needed to address the many threats facing SGCN. For this revision, the DFW determined which of these actions needed to be revised for clarification or specificity, could be removed because they were no longer applicable to current conditions, or could be combined or condensed. The goal in this effort was to make the plan easier to use. The DFW also identified additional actions that could address more recent challenges, such as new wildlife diseases and a growing understanding of climate change.

All of these actions were categorized using the TRACS lexicon and are presented in Appendix I. To better address New Jersey's specific needs and SGCN priorities, the DFW removed some TRACS categories and created new ones. TRACS categories removed included those that were

[24] Brooks, 2009
[25] Ayres and Lombardero, 2000; Bale *et al*, 2002; Weed *et al*, 2013
[26] Logan and Powell, 2001; Logan, *et al*, 2003
[27] Parker *et al*, 1999; Logan *et al*, 2003; Tran *et al*, 2007
[28] Hoffmann *et al*., 2001
[29] Pinsky and Mantua, 2014
[30] NJ Dept of Environmental Protection 2013

not applicable in the state, did not focus on SGCN conservation, or were adequately addressed in other TRACS action categories. New categories were added to address voids in the lexicon.

The TRACS lexicon organizes actions into three tiered levels of increasing detail. As was done with threats and action drivers, the DFW introduced a fourth level containing even more detailed conservation actions specific to New Jersey.

B. Identifying the Actions Associated with the Most Important Threats

Action Development Workshops

In order to reflect on past successes and future needs as a conservation community, the DFW collaborated with the Conserve Wildlife Foundation of New Jersey to host three expert stakeholder workshops in July 2015. The workshops brought together participants to collaboratively identify the broad suite of actions that will guide conservation of New Jersey's SGCN for the next ten years.

An invitee list was generated by the ENSP, the NJ Plan's Executive Committee, and the Conserve Wildlife Foundation of New Jersey. It included more than 460 professionals from state and federal agencies, private organizations, research institutions, land trusts, and universities (all of whom are listed in Appendix L). Because of the wide breadth of knowledge and ground to cover (both topically and geographically), the DWF organized three separate professionally facilitated workshops that each centered on a focal theme or landscape that reflected the unique expertise and interests of the participants.

The first workshop focused on Policy & Planning actions with more than 50 people from 22 agencies and organizations. Discussions explored actions related to the ten IUCN primary threats categories.

The second workshop focused on Habitat Management and Land Protection actions with more than 65 people from 32 agencies and organizations. At this workshop, participants considered actions relating to general habitat types, such as forests, grasslands, and freshwater systems.

The third workshop focused on actions in the Marine Environment and involved more than 30 people from 15 agencies and organizations. Their discussions helped identify actions necessary for addressing threats to marine wildlife and habitats.

The actions presented at the workshops ranged from species- and habitat-specific issues to broader, more comprehensive conservation needs. Ultimately, they lent themselves to the creation of conservation projects that are described in section IV, *Projects to Conserve New Jersey's Wildlife Populations of Concern Report*, below. The participation of this wide array of conservation partners not only made this plan stronger and more comprehensive, it will also help focus limited resources on the actions that will yield the greatest benefits for New Jersey's SGCN.

Actions Distillation

In an effort to identify the conservation actions that would have the greatest impact on wildlife conservation over the next ten years, the DFW filtered the actions (which use the TRACS

lexicon) by identifying those associated with the distilled threats described and presented in section I.C of this chapter. This method, however, resulted in the selection of virtually all of the "level 3" action categories (Table 4).

While inclusive, the list shows the breadth of actions needed to conserve New Jersey's diverse wildlife. More specific species-focused guidance regarding conservation actions is presented in the report, *Threats and Conservation Actions for the Focal Species of Greatest Conservation Need* (Appendix J) and, in the context of broader conservation issues in the report, *Projects to Conserve New Jersey's Wildlife Populations of Concern* (Appendix K).

Table 4. Summary of conservation actions to address the most ubiquitous and severe threats to New Jersey's wildlife and their habitats.

TRACS Level3 ID	TRACS Level 3 Category	TRACS Level 3 Category Definition/Description
1.2.1	Incentives	Development and delivery of economic incentives to private landowners to influence responsible stewardship of land/water and specific species.
2.1.1	Habitat conversion	Conversion of one type of habitat into another (e.g., creating bottomland forest from agricultural land, wetland creation).
2.2.1	Culvert work	Replacement or repair of road culverts (e.g., installing larger culvert, eliminating perching).
2.2.5	Obstruction removal	Removal of other obstructions (e.g., beaver dams).
2.3.2	Fuel reduction	Application of treatments to reduce the risk of high-severity wildfires and to manage changes in the ecological functions of forests (e.g., mechanical thinning).
2.3.3	Prescribed burning	Application of fire in a knowledgeable manner to forest fuels on a specific land under selected weather conditions to accomplish predetermined, well-defined management objectives (e.g., burning an established native grass community to reduce or eliminate invading brush or exotic species).
2.4.2	Hibernacula	Creation or improvement of overwintering sites.
2.6.6	Shoreline armoring removal	Removal of shoreline armoring to improve aquatic habitats (e.g., jetties, riprap).
2.8.0	Invasive species control strategies and implementation	Control of invasive animal and plant species to maintain native species populations and restore ecological functions.
2.9.1	Beach renourishment	Placement of sand onto beaches and employing other techniques for their renourishment.
2.9.2	Erosion control structures	Installation of hard structures (e.g., seawall bulkhead) or living structures (e.g., greenwall systems) to control erosion.
2.9.3	Sand dune restoration	Application of techniques to restore sand dunes (e.g., fencing off sea-grass areas).
2.10.0	Planting/seeding strategies for terrestrial or aquatic habitat	Planting or seeding to maintain fish and wildlife habitats and/or restore ecological functions.

Table 4 (conservation actions) continued

TRACS Level3 ID	TRACS Level 3 Category	TRACS Level 3 Category Definition/Description
2.10.1	Coral	Application of techniques to reestablish coral reefs.
2.11.0	Vegetation management strategies for terrestrial or aquatic habitat	Physical manipulation of vegetation to maintain fish and wildlife habitats and/or restore ecological functions.
2.12.1	Water management: Ditch plugs	Installation of earthen plugs into drainage ditches to restore wetlands.
2.12.2	Water management: Diversion/headgate	Installation or maintenance of structures to divert water.
2.12.3	Water management: Drainage	Removal of tile drains or drainage ditches to restore wetland hydrology.
2.12.5	Water management: Spring development	Application of techniques to improve the flow, quantity and yield of water from a natural spring.
2.12.6	Water management: Tide gate	Installation or maintenance of structures to increase the hydro-period and water depth of a wetland.
2.12.7	Water management: Waterfowl impoundment maintenance	Maintenance of impoundments for waterfowl habitat (e.g., renovation of impoundment dikes).
2.12.8	Water management: Watering facilities	Installation or maintenance of structures to collect and store water for the benefit of wildlife (e.g., water holes, guzzlers, wells).
2.13.0	Nuisance fish and wildlife damage	Assessment and management of damage from nuisance native fish and wildlife, including the effects of predator control via biological, chemical or mechanical means.
2.14.0	Wildlife disease strategy development and investigation	Assessment and management of wildlife disease situations, including control or treatment of diseased animals to maintain populations of species at risk and restore ecological functions.
3.0.0	Research, survey or monitoring - general fish and wildlife needs	Research, survey or monitoring efforts to collect and analyze data regarding long-term or emerging needs of native fish or wildlife species and their habitats.
3.2.0	Research, survey or monitoring - fish and wildlife populations: Data deficiency	Collection and analysis of data as part of research, survey or monitoring primarily focused on fish and wildlife populations.
3.2.1	Research, survey or monitoring - fish and wildlife populations: Abundance determination	Determination of relative abundance or estimation of size of fish and wildlife populations (e.g., adult population estimate, juvenile relative abundance).
3.2.2	Research, survey or monitoring - fish and wildlife populations: Age, size and sex structure	Determination of age, size or sex structure of fish and wildlife populations (e.g., age and growth, length frequency, sex ratio).
3.2.3	Research, survey or monitoring - fish and wildlife populations: Baseline inventory	Baseline survey and inventory to understand distribution of fish and wildlife populations.
3.2.4	Research, survey or monitoring - fish and wildlife populations: Food habits	Studies on food habits of fish and wildlife species or their utilization as prey.

Table 4 (conservation actions) continued

TRACS Level3 ID	TRACS Level 3 Category	TRACS Level 3 Category Definition/Description
3.2.5	Research, survey or monitoring - fish and wildlife populations: Genetics	Genetics studies of fish and wildlife populations (e.g., population connectivity, hybridization).
3.2.7	Research, survey or monitoring - fish and wildlife populations: Population assessment	Assessments of biological information to determine status of fish and wildlife populations (e.g., population viability analysis, fisheries stock assessment).
3.3.1	Research, survey or monitoring - habitat: Baseline inventory	Baseline survey and inventory to understand distribution of fish and wildlife habitat quality and quantity (e.g., wetland mapping).
3.3.2	Research, survey or monitoring - habitat: Monitoring	On-going monitoring of fish and wildlife habitat quality and quantity (e.g., annual early successional habitat survey, artificial reef condition).
3.5.1	Artificial propagation studies	Research on artificial propagation of fish and wildlife (e.g., nutrition studies, culture methods).
3.5.3	Habitat restoration methods	Development or improvement of methods to restore habitats and natural processes (e.g., evaluations of water level fluctuations).
3.5.4	Fish and wildlife research, survey and management techniques	Development or improvement of research techniques or management tools (e.g., tag retention studies, sampling device improvements, testing of animal control devices).
4.1.0	Public education	Provide educational resources and training programs to private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.
4.1.1	Aquatic resource education	Training of new instructors and teachers in aquatic resource education who will teach others Note: This includes teachers, nature center staff and camp counselors who attend ARE workshops, teachers who help the agency write curriculum, etc.
5.15.6	Wildlife Management Areas: Roads	Clearly post vehicular access restrictions of roads and trails on wildlife management areas.
6.0.0	Land and Water Rights Acquisition and Protection: Combined acquisition and protection strategies	Enhance and increase the effective size of fish and wildlife habitats by securing habitats through an appropriate combination of fee title, non-fee title and landowner agreements.
6.1.1	Land and Water Rights Acquisition and Protection: Fee title	Acquisition of lands through fee title acquisition.
6.3.0	Land and Water Rights Acquisition and Protection: Conservation area designation strategies	Designation of a site or landscape as having unique and important value to fish and wildlife with or without legal protections (e.g., waterfowl breeding area, Marine Protected Area).
6.4.0	Land and Water Rights Acquisition and Protection: Private land agreement strategies	Enter into private lands agreements to expand control burns on private lands, in particular those adjacent to conserved lands to improve SGCN habitats.
7.1.2	Law Enforcement: National Level	Enforcement of federal laws and regulations related to the protection of fish and wildlife or their habitats.
7.1.3	Law Enforcement: Sub-national Level	Enforcement of state or municipal laws and regulations related to the protection of fish and wildlife or their habitats.

Table 4 (conservation actions) continued

TRACS Level3 ID	TRACS Level 3 Category	TRACS Level 3 Category Definition/Description
7.1.4	Law Enforcement: Scale Unspecified	Enforcement of unspecified laws and regulations related to the protection of fish and wildlife or their habitats.
8.1.0	Partner/stakeholder engagement strategies	Engagement of partners to achieve shared objectives and broader coordination across overlapping areas.
8.2.3	Recruitment and retention activities: Wildlife watching	Participation in programs intended to recruit and retain wildlife watchers Note: this activity has limited eligibility for funding through WSFR grant programs.
8.3.0	WSFR program/subprogram outreach strategies	Provision of educational information on WSFR grants and grant programs to target audiences.
9.1.0	Land use planning strategies	Leading or participating in land use planning for rural, urban or agricultural lands.
9.2.1	Organizational strategic and operational planning	Development of agency strategic and operational plans Note: Does not include actions to implement plans.
9.3.1	Species management planning	Development of management plans for fish and wildlife species (e.g., interjurisdictional fisheries management planning).
9.3.3	Habitat management planning	Development of management plans for habitats and natural processes (e.g., management planning for longleaf pine habitat; Habitat Conservation Plan development).
11.1.1	Environmental review: Review of proposed projects	Review of proposed development projects to help ensure that impacts to fish and wildlife are minimized and resource benefits are maximized.
11.1.2	Environmental review: Review of proposed policies and plans	Review of non-conservation oriented policies and plans to help ensure that impacts to fish and wildlife are minimized and resource benefits are maximized (e.g., review of harbor dredging plan, review of state highway plans).
11.2.0	Assorted technical assistance strategies	Provision of professional training and technical assistance to others on fish and wildlife assessment and management.
11.2.1	Technical assistance: With individuals and groups involved in resource management decision making	Provision of professional training and technical assistance on fish and wildlife assessment and management to individuals and groups involved in resource management decision-making (e.g., provide agency-collected data to other governmental officials, train non-governmental organizations on new trapping methods, review of conservation-oriented policies and plans).
11.2.2	Technical assistance: Private landowners	Provision of technical assistance on fish and wildlife management practices to private landowners Note: Could Include development and delivery of economic incentives to private landowners to influence responsible stewardship of land/water and specific species.
100.1.2	Legislation: National Level	A directive proposed by a legislative body (bills, laws, acts, statutes) within the federal government.
100.1.3	Legislation: Sub-national Level	A directive proposed by a legislative body (bills, laws, acts, statutes) within a state or sub-national legislative body.
100.1.4	Legislation: County and Local	A directive proposed by a legislative body (bills, laws, acts, statutes) within County or local government.
100.1.5	Legislation: Scale Unspecified	A directive proposed by a legislative body (bills, laws, acts, statutes) at an unspecified level of government.
100.3.0	State regulations: Regulatory initiatives for species and habitat	Specific regulatory initiatives directed at the protection of fish and wildlife and/or their habitats.

Table 4 (conservation actions) continued

TRACS Level3 ID	TRACS Level 3 Category	TRACS Level 3 Category Definition/Description
100.3.2	State regulations: State Land Acquisition Programs	Increase opportunities for habitat restoration by making any necessary policy changes to state land acquisition programs to facilitate acquisition of desirable fish and/or wildlife habitats.
100.4.0	State Agency Policy Integration: Policy initiatives for species and habitat protection	Specific policy initiatives directed at the protection of fish and wildlife and/or their habitats.

C. Future Prioritization of Conservation Actions

The extensive list of conservation actions addresses the highest priority threats discussed in section I.B and presented in Table 3. However, the DFW intends to work closely with conservation partners from 2018 to 2020 to further prioritize conservation actions using a more refined and detailed assessment that considers feasibility, cost, potential effectiveness, and other criteria. The results of this intensive evaluation will be integrated into a revised report, *Threats and Actions of Focal Species of Greatest Conservation Need,* as part of a future revision to this plan.

D. Addressing the Impacts of Climate Change on New Jersey's Wildlife and Their Habitats

The USFWS requires State Wildlife Action Plans to carefully consider the threats created and exacerbated by climate change and to assess actions that can be taken to address those threats. This section explores the approaches and actions that the NJDEP and conservation partners can take locally to address a global challenge.

The consequences of a changing climate, including sea level rise, are forecasted to pose significant threats to New Jersey's natural ecosystems and wildlife. Most climate change impacts will occur by influencing or intensifying many other existing unrelated threats.[30] Not knowing how and the degree to which these impacts will affect wildlife poses major challenges with respect to planning adaptive measures to address those effects. Making the challenge even greater, climate change is a global issue, so the steps needed to address its root causes (e.g., greenhouse gas emissions) are well beyond the purview of this state wildlife plan.
plan.

Fortunately, there is still work that can be completed on the state level to address the *effects* of climate change or to at least facilitate possible adaptations to those effects. Many of the strategies that will help reduce the effects of climate change on New Jersey's wildlife will improve the conditions for wildlife in general and improve their resiliency to a changing landscape. For example, habitat connectivity in coastal areas is a serious concern. Actions that address connectivity – whether in response to development or sea level rise – can yield real benefits to coastal species.

The NJDEP's Bureau of Energy & Sustainability has worked on several fronts to help address statewide climate change mitigation and adaptation concerns in collaboration with other NJDEP programs, other government agencies, and a variety of organizations across New Jersey. These efforts connect to on-going state, regional, and federal adaptation initiatives such as:

- piloting a coastal-community vulnerability assessment protocol;
- testing models of transportation infrastructure vulnerability (with support from the Federal Highways Administration); and
- developing adaptation planning and implementation tools for local governments (though a Sustainable Jersey Climate Adaptation Task Force co-chaired by the NJDEP).

In addition, New Jersey participates in on-going regional and federal adaptation initiatives such as the:

- Mid-Atlantic Ocean Council's identification of regional transportation infrastructure vulnerability to sea level rise and increased flood hazards;
- Northeastern States for Coordinated Air Use Management's adaptation workgroup, which is collaborating on region-wide adaptation issues (e.g., data collection and storage, shared frameworks, and communications);
- National Oceanic & Atmospheric Administration's Climate Ready Estuaries Program to address climate change in coastal areas and watersheds; and
- U.S. Environmental Protection Agency's State and Tribal Climate Change Council to address climate change adaptation issues relating to water.

At the state level, the NJDEP continues to be a strong leader in managing air and water pollution through reasonable and appropriate regulations, including regulations to protect water quality in important waterways that support sensitive species. Of particular note is the NJDEP's participation in the NJ Climate Adaptation Alliance, a Rutgers University-led effort that brings together diverse stakeholders to address climate change preparedness for public health; watersheds, rivers, and coastal communities; built infrastructure; agriculture; and natural resources. In addition, the Alliance is a clearinghouse for guides (such as *Resilience: Preparing NJ for Climate Change*) and tools, such as NJADAPT's Flood Mapper. The Flood Mapper allows users, whether government officials or interested citizens, to visualize coastal flood hazards and sea level rise. The Alliance also lists policy recommendations for the state.

New Jersey's conservation community acknowledges that long-term research and monitoring are required to better understand the effects of climate change on the state's wildlife and their habitats. Therefore, when appropriate, future research will address climate change threats and effects such as increased water temperatures, rising sea level, vegetation changes, changes in food source emergence (e.g., insects, seeds and fruits), changes in migratory routes and timing, and the appearance and disappearance of climate-sensitive species.

This 2017 Revised Plan addresses threats associated with climate change by accepting that there will be inevitable impacts (however difficult they are to precisely predict) and maximizing the ability of New Jersey's habitats and wildlife to adapt to them. To provide a foundation for climate-related actions in the revised plan, the DFW had VanLuven Environmental review, synthesize, and summarize scientific articles and analyses on climate change specifically related to New Jersey's wildlife. This review, entitled *Climate Change Summary for Wildlife Action Plan*, can be found in its entirety in Attachment III.

There are two broad approaches to adaptation. The first is to implement changes that *address and overcome the challenges of climate change*. Strategies include increasing connectivity between protected areas and other refugia, and sustaining ecological processes and functions.[31] This approach recognizes that while there will be major changes across the state, the emphasis is on protecting the species and the habitats that are in New Jersey now. The second approach, developed by Anderson and Ferree (2010), is to *protect the places with geophysical features that are most likely to support species richness regardless of climate change*. This approach can be more difficult for people to accept since it may mean letting go of certain high-risk species, possibly with the result of local extinctions.

The overarching threats at the landscape region scale include temperature changes (shifting temperatures may shuffle species compositions), precipitation and flooding (more intense precipitation can lead to more flooding and erosion in streams and rivers), drought and low stream flows (lower water levels could impede fish access), and sea-level rise (rising waters will lead to the inundation of beaches and marshes).[32]

Although the consequences of climate change and sea level rise are not yet fully understood, it is clear that New Jersey's wildlife populations and the habitats that support them are, and will continue to be, undergoing fundamental changes due to these threats. Stakeholders with a vested interest in protecting the state's wildlife may not be able to influence large-scale policy, such as limiting greenhouse gas emissions in other countries, but there are actions that can be taken to adapt to the impacts of climate change. At the same time, these strategies will help relieve other challenges that wildlife are facing, such as habitat fragmentation and pollution. A comprehensive, holistic approach to wildlife protection may represent the best opportunity for addressing both individual threats and their additive impacts.

E. Collaboration beyond New Jersey's Borders

Many, if not most, of the threats to wildlife and wildlife habitats are not local or unique to New Jersey, and many of the approaches to addressing these threats benefit greatly from collaboration at regional and landscape scales that result in more unified, consistent and effective actions and projects. The close proximity of many northeastern states has engendered a culture of cooperative and/or complementary management approaches. The Northeast Association of Fish and Wildlife Agencies traditionally has supported a strong technical committee structure to further wildlife conservation. Technical committees are species or habitat-focused groups that exchange ideas and develop common approaches to wildlife issues. Typically, these conservation actions are implemented by individual states using their own funds; however, in some cases additional funding has been made available through the Northeast Directors.

---

[31] Staudinger *et al*, 2015
[32] VanLuven, 2015

The Regional Conservation Needs (RCN) program formalizes a cooperative approach to address SGCN needs across multiple states. The purpose of the RCN program is to develop, coordinate, and implement conservation actions that are regional/sub-regional in scope, and build upon the many regional initiatives that already exist. The RCN program utilizes a funding mechanism that is equitable to all Northeast states and the District of Columbia, creating a base of funding for regional projects. Since 2007, thirty-seven different projects have been supported through this program. The resulting reports and products can be found at RCNgrants.org. New Jersey will continue to participate in this and other regional-, watershed- and landscape- scale cooperative approaches to addressing SGCN and habitat conservation needs.

III. Threats and Conservation Actions for the Focal Species of Greatest Conservation Need Report

As described above, New Jersey's wildlife and their habitats face hundreds, if not thousands, of threats to their persistence and well-being. Many of these threats, along with the conservation actions necessary to alleviate their impacts, have been identified in this plan with an emphasis on Focal SGCN.

In this section, we briefly describe the report, *Threats and Conservation Actions for the Focal Species of Greatest Conservation Need* (Appendix J). This report provides extensive and highly detailed lists of threats and the applicable conservation actions for each of the 48 individual Focal SGCN and Focal SGCN guilds, referred to as "conservation targets." Plan users should consider this information when developing new or adapting on-going conservation projects. Additionally, if other species-based plans exist, they are cited within the *Profiles of the Focal Species of Greatest Conservation Need* (Appendix D), and such plans may provide additional management guidance.

This report was generated from a complex database developed and managed by the DFW. The DFW continues to work on the development and deployment of the database with an ultimate intent to make it publicly available and, perhaps, web-enabled. This greater accessibility would enable plan users to query for species, habitats, threats, actions, and geographic areas of interest.

The report identifies the conservation target, the Focal SGCN included within the target (if more than one), the associated threats, and applicable conservation actions. For the threats, the level 1-3 categories and New Jersey-specific statements (level 4) are presented in chronological order of their identification number. Each level 3 category is followed by the average impact rating of the Focal SGCN to help readers identify the issues of greatest concern (threat impact ratings are described in section I.B above, *Evaluation of Threats*). Similarly, applicable conservation actions are presented in chronological order of their identification number.

Excerpts from one conservation target (Allegheny woodrat) within the report, *Threats and Conservation Actions for the Focal Species of Greatest Conservation Need*, have been provided below to illustrate how this information is presented in the report; i.e., the taxonomic group, conservation target, the Focal SGCN within that conservation target (if more than one), the

threats and action drivers associated with the conservation target, and the conservation actions to address those threats and action drivers. Please see Appendix J for the *complete* report on Allegheny woodrat and the other 47 conservation targets.

This page intentionally left blank

Mammals

Allegheny Woodrat

Focal species that comprise this Conservation Target:

Allegheny Woodrat

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:
- 1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.1.1.2 Loss, alteration and/or degradation of habitat.
- 1.1.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:
- 1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.2.1.2 Loss, alteration and/or degradation of habitat.
- 1.2.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats:
- 1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

3 Energy Production and Mining

3.1 Oil and Gas Facilities and Pipelines

3.1.1 Distribution processes of petroleum and other liquid hydrocarbons (Avg. Score: 1.00)

NJ Specific Threats:
- 3.1.1.1 Fragments terrestrial and aquatic habitats.
- 3.1.1.2 Loss, alteration and/or degradation of habitat.
- 3.1.1.3 Increased risk of oil spills.
- 3.1.1.4 Increased noise pollution.
- 3.1.1.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.

3.1.2 Natural gas distribution processes (Avg. Score: 1.00)

NJ Specific Threats:
- 3.1.2.1 Fragments terrestrial and aquatic habitats.
- 3.1.2.2 Loss, alteration and/or degradation of habitat.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 2.00)

NJ Specific Threats: 14.2.1.1 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various forest management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 3.00)

NJ Specific Threats: 15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.4 Secure and promote the protection, restoration, and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.9 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing Forestry Stewardship Programs.

1.2.1.14 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of herbicides and pesticides, and implementing more ecologically safe strategies when using such products.

1.2.1.15 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of rodenticides, and implementing more ecologically safe strategies when using such products.

1.2.1.20 Coordinate across government agencies and non-government organizations to create or expand upon tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMP's.

2 Direct Management of Natural Resources

IV. Projects to Conserve New Jersey's Wildlife Populations of Concern Report

A. Organizing Actions around Issues and Needs

The three Action Development Workshops (described in section II.B above) delivered a wide-ranging list of actions, some of which were directed at overarching benefits to multiple SGCNs and their habitats, and some that were highly specific to individual species. The DFW assessed these actions and grouped them when they addressed a particular threat, a suite of related threats, or a conservation need. These groups of actions – or projects – were then divided into jobs that would collectively help accomplish the project.

From this assessment, the DFW developed the report, *Projects to Conserve New Jersey's Wildlife Populations of Concern* (Appendix K). The report lists 32 projects (Table 5) which include 102 jobs; note, one project and one job are under development. For each job, the report lists:

- Objectives & purpose
- Benefits
- Focal SGCN targeted by the job
- Threats and action drivers
- Conservation actions

The job for one project is presented below as an example of the information provided in this report. Please see Appendix K for the complete report.

While the report, *Threats and Conservation Actions for Focal Species of Greatest Conservation Need*, provides guidance for conservation organized around Focal SGCN, the report, *Projects to Conserve New Jersey's Wildlife Populations of Concern*, provides guidance for conservation organized around broad issues, threats, and needs. The *Projects to Conserve New Jersey's Wildlife Populations of Concern* report is not comprehensive or an exhaustive cataloging of conservation projects, nor does it purport to address all of the highest priority issues. Instead, it is simply a starting point for conservation partners that shows how related and interdependent conservation actions work together within a unified "project" to address overarching conservation needs. The information in the two reports is consistent, but the two different structures are intended to accommodate planning from different perspectives.

B. Future Prioritization of Projects

The DFW intends to work closely with conservation partners to more thoroughly prioritize threats and conservation actions, and to further develop and prioritize projects and jobs. This next phase of planning will be based on further assessment of the threats and applicable actions for Focal SGCN and their habitats, and assessment of threats and development of conservation actions based on Conservation Focal Areas. As projects are further developed and prioritized, performance metrics will be developed for high priority projects to measure success and provide adaptive management feedback. Such metrics will likely include quantities such as acres of habitat restored and occupied by target wildlife, population measurements, and reproductive success, that indicate the effectiveness of conservation actions. The measurable results will be used to adapt the projects and jobs to achieve success or develop new conservation actions.

Projects that are prioritized and revised to include performance metrics will form the revised *Projects to Conserve New Jersey's Wildlife Populations of Concern* report as part of a future revision to this plan.

Table 5. 32 Projects related to Focal SGCN

1. State Wildlife Action Plan Integration and Implementation (2 jobs)
2. Update Landscape Mapping (1 job)
3. Region-based Habitat Conservation Plans: Statewide (1 job)
4. Climate Change Impacts to New Jersey Wildlife and Residents (4 jobs)
5. Barriers to Conservation Efforts (2 jobs)
6. Coastal and Shoreline Stabilization (4 jobs)
7. Unify Coastal Landowners on Beach and Dune Management and Shoreline Stabilization Practices (1 job)
8. Coastal Marsh Migration (2 jobs)
9. Marsh Habitats in Trouble (6 jobs)
10. Best Management Practices (BMPs) to Benefit SGCN and their Habitats (5 jobs)
11. Habitat Management to Improve Ecological Diversity (10 jobs)
12. Habitat Management through Prescribed Burns (3 jobs)
13. Land Management Coordination on Military Properties (1 job)
14. Fostering Habitat in Urbanized/Suburbanized Areas (1 job)
15. Mapping Early Successional Habitat for Planning and Management (1 job)
16. Farming for Bobwhite Quail (1 job)
17. Habitat Connectivity (2 jobs)
18. Invasive and Non-native Species Control (6 jobs)
19. Invasive and Native Species Control (3 jobs)
20. Incentives to Encourage Wildlife Conservation Efforts (5 jobs)
21. Tax Structure for Conservation (1 job under development)
22. Habitat Protection (5 jobs)
23. Land Use Planning (4 jobs)
24. Marine Protection (3 jobs)
25. Fisheries Management (1 job)
26. Pollutants Come in Many Forms (4 jobs)
27. Research and Monitoring (8 jobs)
28. Harvests, By-catch and Impingement (4 jobs)
29. Limiting Effects of Predators (1 job)
30. Do Not Disturb the Birds (2 jobs)
31. Aquaculture, Wildlife and Habitat (5 jobs)
32. Education and Outreach (3 jobs)

Project 29. Limiting Effects of Predators

Job 29.01. Reducing the Impacts of Predators on Beach Nesting Species

Objective: Decrease the impact of predator populations at and adjacent to critical areas for beach dependent wildlife by implementing predator management strategies, including including exclusionary tactics, aversive conditioning, and removal.

Purpose: Decreasing the predation pressure on beach dependent wildlife to result in an increase in adult survival, hatch success, and productivity.

Benefits: Increased reproductive success and survival of beach dependent wildlife.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher | Black Skimmer | Common Tern

Least Tern | Piping Plover | Red Knot

Ruddy Turnstone

Reptiles & Amphibians

Northern Diamondback Terrapin

Threats and Action Drivers associated with this conservation need

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.4 Invasive non-native terrestrial/wetland animals

8.1.4.2 Free-roaming and feral domestic animals such as cats and dogs causes direct mortality of wildlife and disturbance to wildlife breeding and resting areas.

8.2 Problematic Native Species/Diseases

8.2.2 Named Species

8.2.2.2 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

Conservation actions that address Threats and Action Drivers

2 Direct Management of Natural Resources

2.13 Wildlife damage management

2.13.0 Nuisance fish and wildlife damage

2.13.0.6 Develop, implement and evaluate the effectiveness of predator-control techniques aimed at improving SGCN populations and methods to minimize the impact of those species carrying parasites or diseases that may impact SGCN (e.g., raccoon roundworm kills Allegheny woodrat).

3 Data Collection and Analysis

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.22 Evaluate the effectiveness of predator-control techniques aimed at improving SGCN populations and methods to minimize the impact of those species carrying parasites or diseases that may impact SGCN (e.g., raccoon roundworm kills Allegheny woodrat).

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.21 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation human-subsidized and/or overabundant, native species cause to local nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.22 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation invasive species cause to native nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.6 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners, land managers and local communities to discourage the presence of managed cat colonies and trap, neuter and release programs in wildlife habitats.

8.3.0.19 Develop an educational outreach program for the public on the devastating effects predators can have on native nesting wildlife.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.11 Develop a management plan using predator-control techniques aimed at improving SGCN populations and methods to minimize the impact of those species carrying parasites or diseases that may impact SGCN (e.g., raccoon roundworm kills Allegheny woodrat).

V. Future Work with Conservation Focal Areas

As noted in Chapter 2, "Habitats of New Jersey," delineation of Conservation Focal Areas (CFAs) represents the second of a two-part approach to identifying and understanding threats to New Jersey's Species of Greatest Conservation Need (SGCN) and developing actions that will address these threats. The CFAs highlight specific areas of New Jersey that feature some of the highest value wildlife habitats and/or present greater opportunities for effective conservation action. In combination with Focal SGCN, conservation actions in CFAs will benefit virtually *all* SGCN and, in turn, all of New Jersey's wildlife. Also, by highlighting specific areas of New Jersey's landscapes for effective conservation actions, to the extent that conservation partners choose to use the CFA maps to guide the selection of areas to implement conservation actions, those actions will be directed towards a variety of "conservation target rich" areas that will benefit *all* wildlife, not just those that appear in the plan as "focal species."

Following a re-examination and possible refinement of CFAs (see Chapter 2), the DFW will undertake a more geographically specific examination of threats and development of actions targeted at the greatest threats to those areas.

Any future re-examination and modification of CFAs will include evaluation of the Northeast Regional Conservation Opportunity Areas, now called "Nature's Network."[33] Completion of CHANJ mapping and guidance, described in the Introduction, in Section IV.A, *Connecting Habitats Across New Jersey (CHANJ)*, and in Chapter 2, Section I.B, *Use and Future Development of CFAs*, is anticipated in the next year (2018), and the results of that assessment may also be included in any possible re-configuration of CFAs. Whether these or other ongoing geographically specific assessments of habitat are used to modify CFAs, they will be included in future planning to, especially planning that will direct conservation actions at specific locations within the state. The CHANJ products, for example, will provide geographically specific guidelines for addressing the threats posed by roads and other forms of habitat fragmentation, and these guidelines will be incorporated into future revisions of this Plan just as Landscape Project products currently are.

VI. Integrating Flora and Natural Communities as Important Components of Biological Diversity

This plan explicitly focuses on the development and implementation of actions to conserve SGCN and the habitats on which they depend. Although plants are not addressed as species of conservation concern in the plan, New Jersey supports extraordinarily diverse flora of more than 2,140 native taxa, including 818 rare plants of which 356 are listed as state endangered. Ecological communities provide important habitats for these rare plants in addition to SGCN.

Most of the threats confronting New Jersey's wildlife populations similarly affect its native flora and ecological communities. The actions, projects, and monitoring programs presented in this plan for wildlife also provide an opportunity to conserve these other important elements of biological diversity. At the same time, without proper precautions, actions directed at enhancing wildlife, especially on-the-ground actions that modify habitats, may pose risks to rare plants.

In recognition of this challenge, the DFW partnered with the New Jersey Natural Heritage Program, the NJDEP's plant conservation program, to develop guidance for integrating plant species of conservation concern into wildlife planning and action implementation. The resulting report focuses on four habitat types within two landscape regions that are critical to a suite of plant and wildlife species, and provides examples of how to integrate rare plant and wildlife conservation planning and adaptive management. The report, presented in Attachment IV (Part 1), follows the geographic organization of the 2008 Revised Plan.

Attachment IV (Part 2) also includes tables indicating occurrences of plants of conservation concern by landscape regions and broad habitat categories.

CHAPTER 4: MONITORING

Monitoring comes in many forms and can serve many different conservation purposes. At the most basic level, monitoring can simply note whether or not a species continues to be present at a given location. At a more detailed level, monitoring can help managers determine the effectiveness of conservation actions and, in turn, adapt management activities to maximize their benefits.

I. Monitoring Programs & Projects

This Plan documents a broad spectrum of threats to SGCN wildlife and their habitats in New Jersey. The identification of focal species and geographic focal areas is the start of a more focused conservation approach, but to increase the value of this plan further, additional work is needed to prioritize work. DFW staff will reach out to consult with conservation partners and stakeholders in the next three years to prioritize projects and actions, and identify monitoring methods to measure success. The USFWS developed TRACS to help identify the metrics by which conservation actions and projects can be evaluated (Appendix M). DFW will lead the process to change or design projects that include appropriate performance metrics to judge the success of conservation actions, and the steps for adapting actions in response to those metrics.

The DFW leverages its relationships with agencies and organizations with conservation interests and/or influences to help construct appropriate and achievable monitoring metrics and programs. Organizations have a variety of interests and roles in wildlife and habitat conservation which lends to the challenge of identifying performance metrics and programs for the wide variety of projects and SGCN wildlife. The DFW will promote the use of results-chain graphics (as presented in B., below) and the TRACS approach to develop target goals and metrics.

A. Past & Current Monitoring Programs

Many of New Jersey's SGCN and habitats have active monitoring programs, some dating back more than 60 years. Table 6 provides a concise list of these 62 programs. Some of these ongoing monitoring programs will provide data useful to evaluating the effectiveness of conservation projects and actions.

Notable monitoring programs in New Jersey include:

- The ENSP's **Landscape Project** maps critical wildlife habitat using species occurrence data applied to dynamic data on suitable habitat types. Adopted by the NJDEP in 1993 to define habitat, it is a powerful tool for conservation planning.
- The DFW's **Habitat Change Analysis Project** (HCAP) tracks wildlife habitat transition and fragmentation trends over time. The ongoing analysis uses GIS to identify potential habitat from available land use and land cover data based on species habitat associations and range extents. Products from the analysis include up-to-date, multi-level, species-specific habitat change information to support agency management initiatives
- **Submerged Aquatic Vegetation Monitoring** in Barnegat Bay is a long-term project that provides an indicator of water quality and the health of the food web for aquatic and waterfowl species.

- The **Breeding Bird Survey** in New Jersey is part of the national breeding bird survey that is used to detect bird population trends nationally and, to a lesser degree, within the state. Conducted largely by skilled volunteers, the data are considered each time the state reassesses bird species conservation status and trends.
- The **New Jersey bald eagle survey** has successfully tracked the expansion of nesting bald eagles since the time when there was just one nest in the state. The survey is primarily conducted by volunteers, and results are used to track recovery of the state population and as part of the federal monitoring plan for bald eagles.
- The **Saltmarsh Habitat and Avian Research Program** is a new survey that was designed to detect population trends in a group of bird species that are difficult to survey. It is already proving useful for carrying out adaptive management for rare species.
- The **winter bat hibernacula survey**, begun in 1995, has provided valuable data on bat populations after widespread mortality due to white-nose syndrome. It will remain an important measure of cave-dwelling bat populations well into the future.
- Since 1968, the DFW's **Trout Production Stream monitoring** has identified and classified New Jersey waters according to their suitability for trout. The classification levels are based on a waterway's ability to support trout year-round (lakes) or occurrence of natural production, presence/absence of trout, and/or trout associated species (streams). The classifications became part of the state's Surface Water Quality Standards in 1981, and trout-suitable waterways received greater protection under state regulations.
- Since 1992, the NJDEP has conducted **benthic macroinvertebrate sampling** at more than 760 Ambient Macroinvertebrate Network (AMNET) stations within the state's 20 Watershed Management Areas. Results are used to evaluate aquatic life use, designate Category One waters, and inform New Jersey's Long-Term Water Monitoring and Assessment Strategy and other publications.

Table 6. Summary of 62 Species and Guild-Level Monitoring Programs by the NJDEP and Conservation Partners.

Monitoring Program or Action	Implementation Lead	Monitoring Level			Monitoring Target	Metrics	Start Year
		Species	Guild	Habitat			
HABITATS							
Habitat Change Analysis Project (HCAP)	DFW			X	Habitat of endangered and threatened wildlife	Acres of suitable habitat, acres of change, etc.	1986-
Forest Inventory/Analysis	U.S. Forest Service			X	Forests	Acres, Species	1955-
Submerged Aquatic Vegetation Monitoring	NJDEP Water Monitoring & Standards			X	Habitat quality	Acres, Species	1968-
Rivers and Streams Chemical/Physical Monitoring	NJDEP Bureau of Freshwater & Biological Monitoring			X	Water/habitat quality	Water chemistry	1975-
Ambient Surface Water Quality Monitoring Network	NJDEP Bureau of Freshwater & Biological Monitoring			X	Water quality	Water chemistry	1976-
NJ Natural Heritage Program	NJ Natural Lands Trust	X		X	Rare plant communities	Plant species occurrence	1980-

Table 6 (monitoring programs) continued

Monitoring Program or Action	Implementation Lead	Monitoring Level			Monitoring Target	Metrics	Start Year
		Species	Guild	Habitat			
HABITATS (*continued*)							
Marine Water Monitoring	NJDEP Bureau of Marine Water Monitoring			X	Water quality	Water chemistry	1989-
Landscape Project Critical Habitat Mapping	DFW	X		X	Habitats used by rare wildlife	Acres of documented habitat	2001-
Lake Monitoring	NJDEP Bureau of Freshwater & Biological Monitoring			X	Water quality	Water chemistry	2005-
Barnegat Bay Water Quality Monitoring	NJDEP Water Quality & Standards			X	Water quality	Water chemistry	2011-
Ocean and Coastal Acidification Monitoring	Barnegat Bay Partnership			X	Water quality	Water chemistry	2016-
Long-term Environmental-monitoring Programs in Pinelands Region	NJ Pinelands Commission		X	X	Water quality, vegetation, fish and anuran communities	Water chemistry; number of fish; number of frogs	1992-
Submerged Aquatic Vegetation Monitoring in Barnegat Bay	Barnegat Bay Partnership/Stockton University	X	X	X	Habitat quality, eelgrass, widgeon grass, other	Biomass/meter and condition	2015-
Submerged Aquatic Vegetation Monitoring in Barnegat Bay and Little Egg Harbor	Rutgers University	X	X	X	Habitat quality	Acreage	2001-2011
BIRDS							
Christmas Bird Count	National Audubon Society	X	X		Wintering birds	Number of birds by species	1920-
Winter waterfowl survey	DFW	X			Black duck, Canada goose, Atlantic brant	Number of birds by species	1955-2015
American woodcock survey	DFW	X			American woodcock	Number of birds	1965-
Breeding Bird Survey	USGS	X	X		Breeding birds	Number of birds by species	1966-
Northern bobwhite survey	DFW	X			Northern bobwhite	Number of birds	1970-
Black skimmer nesting survey	DFW	X			Black skimmer	Number of birds; Number of colonies; Productivity	1976
Colonial waterbird survey	DFW	X	X		Gulls, terns, herons, egrets	Number of birds; Number of colonies	1976-
Osprey nest survey	DFW; Conserve Wildlife Foundation of NJ	X		X	Ospreys	Number of nests; Productivity	1977-

Monitoring Program or Action	Implementation Lead	Monitoring Level			Monitoring Target	Metrics	Start Year
		Species	Guild	Habitat			
HABITATS (*continued*)							
Bald eagle nest survey	DFW	X			Bald eagle	Number of nests; Productivity	1978-
Peregrine falcon survey	DFW	X			Peregrine falcon	Number of nests; Productivity	1980-
Grassland bird survey	DFW	X	X	X	Grasshopper sparrow, vesper sparrow, Henslow's sparrow	Number of birds by species	1980-2014
Piping plover productivity survey	DFW	X			Piping plover	Number of nests; Productivity	1983-
Migratory shorebird survey	DFW	X			Red knot, ruddy turnstone, sanderling	Number of birds	1986-
Breeding waterfowl survey	DFW	X			Black duck, mallard	Number of birds by species	1990-
Monitoring Avian Productivity and Survivorship Program	USGS; DFW	X			Forest interior songbirds	Number of birds by species; Productivity	1994-2012
Neotropical Migrant Survey	DFW		X		Breeding birds	Number of birds by species	1994-2007
Golden-winged warbler monitoring	DFW	X		X	Golden-winged warbler	Number of birds; Productivity	2000-
International Piping Plover Census	DFW	X			Piping plover	Number of birds	1991-
American oystercatcher productivity survey	DFW	X			American oystercatcher	Number of birds; Productivity	2003-
Saltmarsh Habitat and Avian Research Program	DFW	X			Clapper rail, willet, salt marsh sparrow, seaside sparrow, coastal plain swamp sparrow, Nelson's sparrow	Number of birds by species	2011-2012
Secretive marshbird survey	DFW	X			Black rail, Virginia rail, clapper rail	Number of birds by species	2015-2016
Winter Atlantic brant/tundra swan survey	DFW	X			Atlantic brant, tundra swan	Number of birds by species	2016-
REPTILES & AMPHIBIANS							
Herp Atlas	DFW	X	X		Reptiles and amphibians	Number of animals by species	1992-2014

Table 6 (monitoring programs) continued

Monitoring Program or Action	Implementation Lead	Monitoring Level			Monitoring Target	Metrics	Start Year
		Species	Guild	Habitat			
REPTILES & AMPHIBIANS (*continued*)							
North American Amphibian Monitoring Program	USGS; DFW	X	X		Amphibian SGCN	Number of animals by species	1996-2015
MAMMALS							
Winter bat hibernacula survey	DFW	X		X	All 6 cave bat species	Number of bats by species	1995-
Summer bat maternity surveys	DFW	X			Little brown bat, big brown bat, Indiana bat	Number of bats by species; Productivity	2009-
Summer bat acoustic surveys	DFW	X			All 9 bat species	Number of bats by species	2011-
FRESHWATER AQUATICS							
Trout production stream monitoring and Surface Water Classification	DFW	X	X	X	Brook trout, slimy sculpin, all fish	Number of fish by species and age class; Water chemistry	1969-
AMNET Macroinvertebrate Monitoring	NJDEP Bureau of Freshwater & Biological Monitoring	X	X	X	Mayflies, stoneflies, caddisflies and other macroinvertebrates	Number and species by CPUE*; EPT (presence-absence)	1992-
Freshwater mussel monitoring	DFW	X			Native mussels	Number and species by CPUE*; Rare species presence-absence	1995-
Native/Rare fish monitoring	DFW	X	X		10 E/T/SC species (plus data deficient waters)	Number and species by CPUE*	2000-
Anadromous fisheries monitoring	DFW	X			American shad and other Clupeids	Number and species by CPUE*	1972-2012
Anadromous fisheries monitoring-Raritan River	Rutgers	X			American shad and other Clupeids	Number and species by CPUE*	2013-
Anadromous fisheries monitoring-Delaware River	PA Game Comm.	X			American shad	Number and species by CPUE	2007-
Fish Index of Biotic Integrity	NJDEP Bureau of Freshwater & Biological Monitoring; Fish & Wildlife	X	X	X	Fish	Number of fish by species by CPUE*; Water chemistry	2000-
Invasive freshwater mussel monitoring	DFW	X			Chinese pond mussel	Presence/ absence	2011-

Monitoring Program or Action	Implementation Lead	Monitoring Level			Monitoring Target	Metrics	Start Year
		Species	Guild	Habitat			
FRESHWATER AQUATICS (*continued*)							
Stream temperature monitoring for fisheries	DFW	X	X	X	Stream fishes and water temperature	Number and species by CPUE*; Water temperature	2014-
Warmwater fisheries monitoring	DFW	X	X		Freshwater fish species	Number and species by CPUE*; Fish length, weight, age	1950-
Potentially dangerous fish monitoring	DFW	X			Snakehead, Asian swamp eel, flathead catfish, and 7 other species	Presence/ absence	2005-
MARINE AQUATICS							
Oyster Inventory	DFW	X			Eastern oysters	Proportion live oysters, spat set, and size of adults	1953-
Striped Bass Young of Year, Delaware River	DFW				Striped bass	Number of juvenile fish by CPUE*	1980-
Hard clam stock assessment	DFW	X			Hard clams	Number, density of clams	1983-
Surf clam inventory	DFW	X			Surf clams	Number, density of clams	1988-
Ocean trawl survey	DFW	X			Marine fish	Number and species by CPUE*	1988-
Juvenile finfish trawl survey in Delaware Bay	DFW	X			Finfish	Number and species by CPUE*	1991-
Horseshoe crab spawning survey	DFW	X			Horseshoe crabs	Number of crabs by meter shoreline	1999-
Horseshoe crab egg density survey	DFW	X			Horseshoe crabs	Density of eggs in sand	1999-
River herring survey	DFW	X	X		Alewife, blueback herring	Number and species by CPUE*	2012-
Artificial reef trap surveys	DFW	X	X		Structure-associated species	Number and species by CPUE*	2016-
Juvenile Fish and Nekton Seining in Barnegat Bay	Barnegat Bay Partnership	X	X		Fish	Number and species by CPUE*	2011-

Table 6 (monitoring programs) continued

Monitoring Program or Action	Implementation Lead	Monitoring Level			Monitoring Target	Metrics	Start Year
		Species	Guild	Habitat			
MARINE AQUATICS (*continued*)							
Juvenile Eel Monitoring in Barnegat Bay	Barnegat Bay Partnership	X			American eel	Number and species by CPUE*	2012-
Anadromous Fish Monitoring	Barnegat Bay Partnership	X	X		Alewife and Blueback herring	Number and species by CPUE*	2014

* CPUE means catch per unit effort

B. Strengthening Monitoring through Results Chains

The DFW will use results chains to help show how conservation actions will lead to the desired results. Results chains are simply diagrams that show the connections between threats, actions, and conservation outcomes. Results chains are not only useful for thinking through and selecting conservation actions, they are powerful tools for identifying monitoring strategies. Two sample scenarios using results chains are shown below for bog turtles and scrub-shrub and young forest habitat management.

Scenario 1: Bog Turtle

The following scenario presents a model framework for monitoring and measuring the effectiveness of conservation actions for the bog turtle.

Once abundant throughout New Jersey, bog turtles are now primarily restricted to the remaining rural portions of the state, particularly Sussex, Warren, and Salem counties. Although listed as endangered in the state and as threatened at the federal level, New Jersey is a stronghold for the species in the Northeastern U.S. As of 2015, there were 99 core bog turtle habitats in New Jersey, 54 of which were considered to be metapopulations (which are defined as one or more populations that are close enough for bog turtles to occasionally move between them and for genetic exchange).

Bog turtles inhabit fens, bogs, and wet meadows with mucky, organic soils that are kept saturated by groundwater discharge. Plant communities associated with bog turtle habitats vary, but most are dominated by low-growing grasses, rushes, mosses, and other herbaceous species with little shrub or tree cover. Notable physical features include spring-derived rivulets, shallow, mucky pools, and abundant hummocks of tussock-forming sedges and raised mounds of moss.

Bog turtles are habitat specialists that rely on abundant groundwater resources, organic soils, diverse herbaceous vegetation, and contiguous tracts of land for dispersal. Intense land-uses such as urbanization and industrial farming destroy bog turtle habitats through direct wetland alteration and secondary impacts such as stormwater runoff, local draw down of water tables, and nutrient enrichment.

In partnership with the U.S. Fish & Wildlife Service (USFWS) and other bog turtle recovery partners, New Jersey is currently assessing its 54 known metapopulations. Over the next several

years, the USFWS Northeast Region (Region Five) will develop new protocols for assessing bog turtle status and update the current recovery plan. These revisions will be informed by intensive efforts over the last five years to standardize data collection across the Northeastern states, new datasets that are emerging from the standardized procedures, and legacy data. A likely focus for recovery will be larger wetland complexes composed of several core bog turtle habitats because they can support key biological dynamics (such as dispersal, colonization, and gene flow) that are necessary to keep populations functionally viable. Fragmented or isolated populations, while still important to protect, are vulnerable to random events such as severe floods, disease, and collection, and are also potentially at risk of becoming genetically impoverished over time.

In the 1990s, the ENSP launched a comprehensive management approach to guide conservation of important bog turtle populations in New Jersey. The management initiative consists of four main actions:

1. developing relationships with private landowners that have bog turtles on their land;
2. facilitating the acquisition of core bog turtle habitats threatened by adjacent land use activities;
3. undertaking and improving habitat management techniques to control and reverse habitat succession and invasive exotic plant proliferation; and
4. working with partners to develop and implement land-use planning that considers bog turtle.

More than half of bog turtle habitats in New Jersey are in need of management or restoration. Succession from open-canopy habitat to woody species and proliferation of invasive plants (e.g., purple loosestrife, Phragmites, multiflora rose, Japanese stiltgrass, and reed canary grass) are the primary threats to habitat quality, and most of these plants are extremely difficult to control. However, as aggressively as these plants invade, the ENSP is combating these floristic invaders with equivalent ferocity through several methods.

Grazing by sheep, goats, cattle, and other domestic livestock in bog turtle habitats has been demonstrated to slow natural succession, control expansion of fast-growing invasive species, augment hydrological regimes by reducing surface vegetative matter and breaking up peat accumulation, create microhabitats for bog turtles in the form of footprints, and encourage the growth of hummocky vegetation that bog turtles use for nesting. Over the last 20 years, the ENSP has coordinated and implemented prescribed grazing at more than 20 wetlands across the bog turtle's range in New Jersey. In addition to grazing, the ENSP has coordinated with many partners to cut and remove woody vegetation and treat invasive or exotic vegetation with targeted herbicidal applications. Habitat restoration or maintenance has been carried out at nearly half of New Jersey's core habitat areas.

Bog turtles are often found in wetlands that also support rare plant species. Some habitat management practices (such as invasive species control and grazing) and monitoring practices (such as drift fence arrays) can be harmful to rare plant populations, depending on how the practices are implemented. Attachment IV provides guidance on vegetation management practices that minimize or avoid negative impacts to rare plants in bog turtle habitats. There is a similar risk of unintended consequences for rare plants in other wildlife habitats.

To restore degraded bog turtle habitats in New Jersey, the ENSP is pursuing the following restoration action: use woody vegetation control and prescribed grazing to reduce invasive plant species cover and slow succession.

A results chain for this restoration action shows the connections between the conservation elements:

Action: Use woody vegetation control and prescribed grazing to reduce invasive plant species cover and slow succession at four core habitats per year. Monitor turtle population size and structure at core habitats once every five years.

Objective: Increase the number of documented bog turtle occurrences at restored wetlands. Through habitat improvements, increase core habitat population size to at least 15 female turtles. Increase the number of known populations through assessments and surveys of new habitats.

Threat: Dense cover of invasive plant species or excessive woody vegetation makes wetlands unsuitable for bog turtles.

Target: Bog turtles

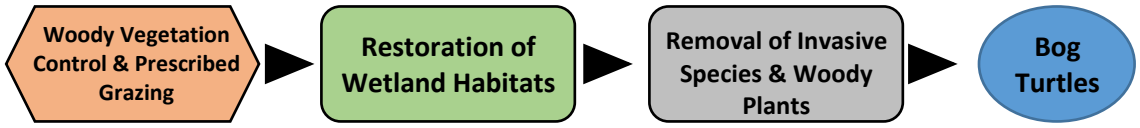


Figure 9. Results chain for restoration of wetland habitats to support bog turtles.

To assess the effectiveness of this direct management action, the DFW will follow the regional habitat monitoring protocols developed in coordination with the USFWS and state wildlife agencies across the bog turtle's range in the Northeast, as follows.

A. Quantify and track changes in vegetation structure.
B. Quantify and track changes in wetland-specific plant community distribution.
C. Evaluate the effect of the restoration on bog turtles through supplemental population monitoring protocols.

The data collected from these monitoring efforts will be used to track the effects of the management activities and thereby inform adaptive management of sites in New Jersey and regionally.

Scenario 2: Scrub-shrub & Young Forest Habitat Management

Mosaics of scrub-shrub and young forest habitats are vital for a variety of SGCN, notably golden-winged warbler, northern bobwhite, and wood thrush. Scrub-shrub and young forest habitats are rare in New Jersey in part because they are transitional stages between field and forest, so are always changing.

There are, however, opportunities to maintain and create these important habitats along powerline rights-of-way, at fallow agricultural sites, and on some public lands. With partners such as New Jersey Audubon and the Conserve Wildlife Foundation of New Jersey, the DFW is

undertaking vegetative management projects and developing best management practices for use by other conservation partners.

To create and retain scrub-shrub and young forest habitats in northern New Jersey, the ENSP is pursuing the following restoration action: In large contiguous forest blocks (>2,500 acres) with >70% mature forest cover, use prescribed forest thinning in mature forests to create a mosaic of early successional forest habitat (not to exceed 20% of entire forest block at a time) that consists of more than 50% native shrubs/saplings and 10-15 trees per acre over 9 inches in diameter at breast height, or an approximate basal area of 30 ft^2 per acre with 10-40% canopy cover.

A results chain for this restoration action shows the connections between the conservation elements:

Action: Use prescribed forest thinning to create early successional forest habitat that consists of more than 50% native shrubs/saplings and 10-15 trees per acre over 9 inches in diameter at breast height, or an approximate basal area of 30 ft^2 per acre with 10-40% canopy cover

Objective: Create scrub-shrub and young forest habitat to support viable populations of early successional species

Threat: Natural succession that transitions scrub-shrub and young forest habitats into closed-canopy forests eliminates important habitats for a variety of SGCN

Target: Young forest dependent species including golden-winged warbler, northern bobwhite, and wood thrush

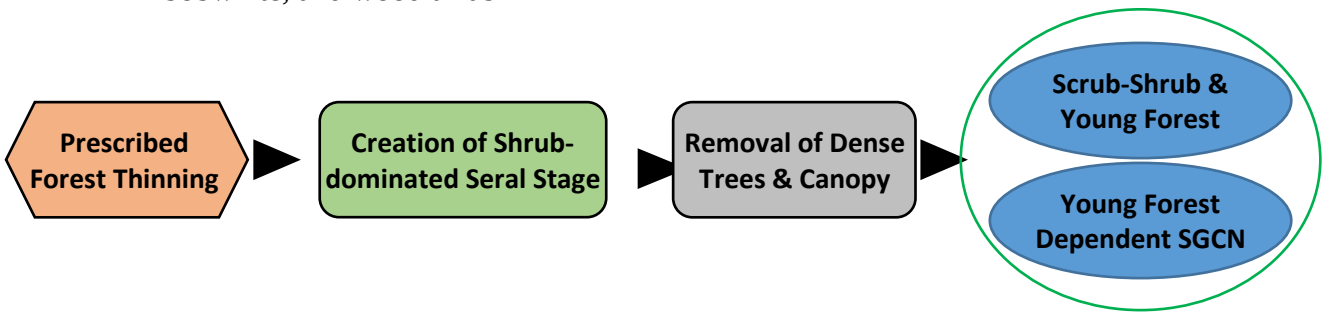


Figure 10. Results chain for creation of scrub-shrub habitats to support young forest dependent species.

To assess the effectiveness of this direct management action, the DFW will undertake strategic monitoring, as follows.

A. Number of individuals and species (including Focal SGCN) occurring in managed areas annually following management actions.
B. Vegetative structure as measured in May and June of each year following management actions.

The results of these monitoring efforts will be shown graphically (Figure 11), potentially in the formats shown below.

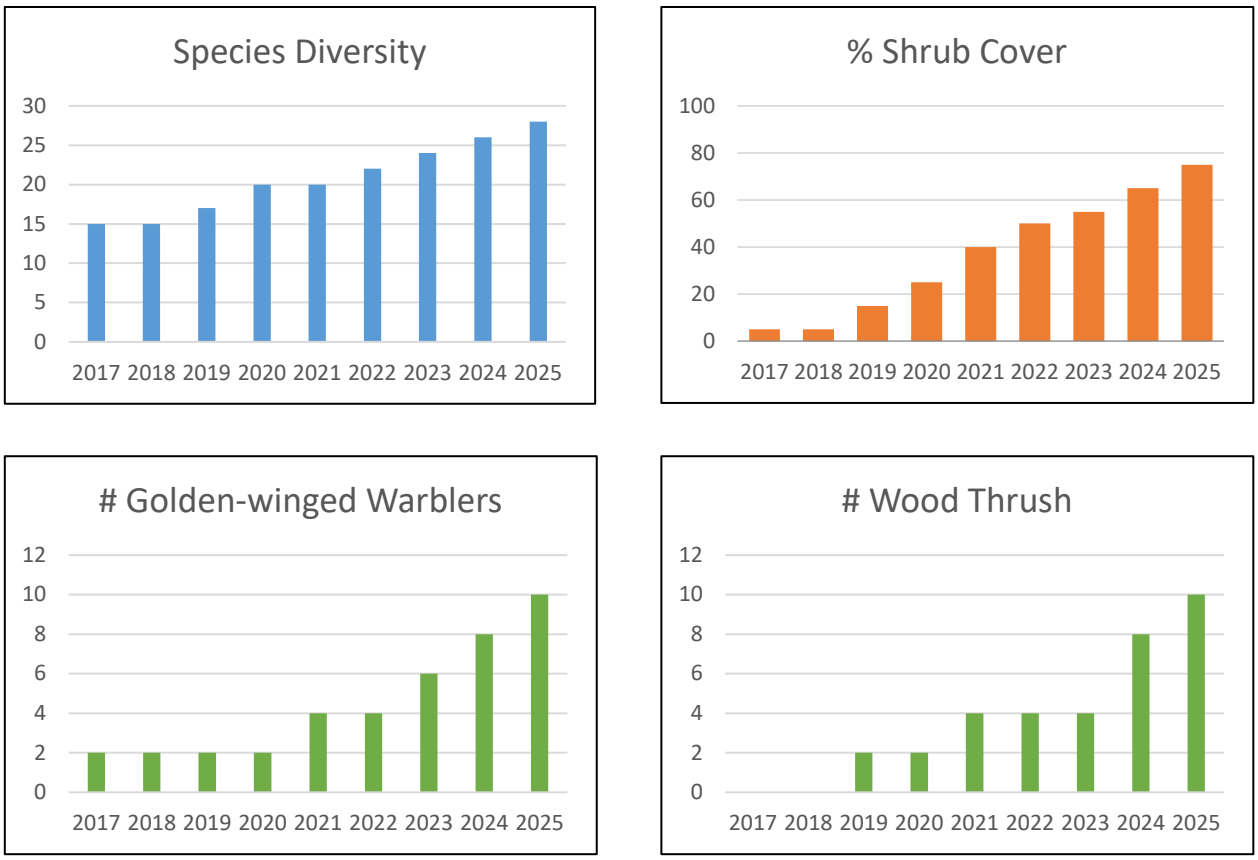


Figure 11. Example of how the results of future monitoring efforts for scrub shrub and young forest species could be depicted.

II. Adaptive Management

Adaptive management is the process through which conservation actions are undertaken, assessed through careful monitoring, and then modified as necessary based on the monitoring results. Successful adaptive management requires the completion of six interrelated steps.

1. Assessing a problem with the recognition that there is uncertainty about what policy or action is best for addressing it.
2. Designing a strategy based on a careful selection of policies and management actions.
3. Implementing a policy or action that is likely to show where additional information is needed.
4. Monitoring key indicators to get insights into responses to the policy or management action.
5. Analyzing the outcomes in relation to the original objectives to determine the effectiveness of the applied policy or action.
6. Adjusting the policy or action based on the analysis, and incorporating the new information into future decisions.

Adaptive management is necessary because there is still so much that is unknown about wildlife, their habitats, and the complex interactions of these with the surrounding world. In addition to

gaining insights into wildlife management from conservation and monitoring efforts in New Jersey, the DFW is also committed to learning from, and contributing to, work on SGCN in other states.

In the next three years, DFW staff will consult with conservation stakeholders to identify the highest priority conservation actions and projects to improve the status of SGCN in the state. Prioritization of actions and projects should highlight the 107 focal SGCN species as well as Conservation Focal Areas that are important for all SGCN. Conservation projects and jobs that result from the prioritization process will incorporate appropriate monitoring approaches that provide measures of success of steps necessary toward achieving the goal of improving species' status. Monitoring efforts should be explored that leverage the assistance of a variety of qualified conservation partners. Descriptions or graphics identifying the results-chain(s) for projects are helpful for focusing actions, monitoring, and results. Adaptive management can then be applied to ongoing management projects that continue or shift actions as necessary.

III. Coordinating State & Regional Monitoring

While it is simple to state monitoring goals, it is much more challenging to implement them. Monitoring can be extremely time and resource intensive. Further, it can be difficult to connect conservation actions to observed population conditions because so many factors and influences are continually at play in nature.

To help overcome these challenges, the Association of Fish & Wildlife Agencies in 2012 proposed a set of best management practices to help states establish monitoring programs that both met their specific goals and integrated smoothly into monitoring programs regionally. A key component of these recommendations was the use of the U.S. Fish & Wildlife Service's Tracking and Reporting on Actions for Conservation of Species (TRACS) system to allow information gathered on SGCN in New Jersey to be integrated with information gathered in other states. This collaborative approach of using the same metrics to track progress toward goals will allow managers to better target their SGCN management actions to achieve the greatest conservation benefits, both in New Jersey and throughout each species' range. We include the table of TRACS indicators in Appendix M.

CHAPTER 5: STATE WILDLIFE ACTION PLAN REVISION PROCESS

I. Future State Wildlife Action Plan Revisions

From 2018 to 2021, the DFW will continue revising the 2017 State Wildlife Action Plan to fill information gaps, provide additional clarity and guidance to plan users, and prioritize conservation efforts, as outlined below.

- **Threats & Actions for Conservation Focal Areas (CFAs)**: The DFW identified CFAs that represent important habitats in each physiographic region of the state, but did not assess the threats to each specific area. With input from conservation partners, the DFW plans to develop a database of threats and conservation actions for each CFA. To a large degree, the threats already documented in the plan can be applied to the CFAs, but an assessment and prioritization of threats specific to each will provide a more complete list. Identification and prioritization of actions for CFAs would follow.
- **Actions for Focal Species of Greatest Conservation Need**: The DFW documented threats and conservation actions aimed at the 107 Focal SGCN, but the actions need to be prioritized with input from conservation partners. Prioritization will consider the immediacy of threats, likelihood of success, and feasibility (as the current action lists have done).
- **Projects**: The DFW will continue to review the *Projects to Conserve New Jersey's Wildlife Populations of Concern* report to (a) add and expand jobs to existing projects, and (b) develop new projects. New projects will be added to address threats and prescribe actions for conservation of Focal SGCN and CFAs.
- **Information Gaps**: The DFW will develop a plan for itself and conservation partners to collect information on data-deficient species, especially those that are regional conservation priorities.

A comprehensive review of the entire State Wildlife Action Plan and revisions based upon that review will be undertaken within ten years. To the extent appropriate and feasible for New Jersey's specific planning approach, this review will be conducted according to the "Best Practices for State Wildlife Action Plans – Voluntary Guidance to States for Revision and Implementation (2012)."

II. Coordination with Other Agencies

The ENSP initiated the plan revision process by coordinating with many stakeholders and interest groups. In 2013, invitations were sent to select conservation organizations and resource managers to form an Executive Committee to help steer development of the State Wildlife Action Plan. The organizations that accepted invitations were the U.S. Fish and Wildlife Service-NJ Field Office, the U.S. Department of Agriculture-Natural Resources Conservation Service, the Conserve Wildlife Foundation of New Jersey, the New Jersey Audubon Society, The Nature Conservancy, Ducks Unlimited, the National Wild Turkey Federation, Trout Unlimited, and staff from all Bureaus of the NJ Division of Fish and Wildlife.

The ENSP convened the Executive Committee on eight occasions between the fall of 2013 and the last stages of plan development during 2017. The most significant gathering was a full day meeting in which 22 attendees discussed key decision points such as the criteria used to select SGCN, the strategy and criteria used to further prioritize SGCN into Focal SGCN, and a process for delineating Conservation Focal Areas. Other meetings which preceded or followed that date were held by conference call or were web-enabled meetings.

Additional stakeholder coordination was achieved through regular meetings of the Endangered and Nongame Species Advisory Committee (ENSAC) and the Fish and Game Council. These groups are legislatively established bodies that provide advice and guidance to the DFW. The ENSAC is composed of 11 members appointed by the NJDEP Commissioner, with 4 representing academic institutions, 3 nonprofit conservation organizations, 1 public health/veterinary sciences, and 3 "public at large" members. The ENSAC serves a key role in advising the ENSP on technical and policy issues, and the State Wildlife Action Plan development process and its status was a frequent topic of meetings. The State Wildlife Action Plan was discussed during at least 15 public meetings (7/20/11, 1/16/13, 1/29/14, 6/26/14, 11/19/14, 1/21/15, 4/1/15, 5/20/15, 9/9/15, 11/18/15, 1/7/16, 3/16/16, 5/18/16, 1/18/17, 4/19/17) in which members received updates on process decisions and gave feedback. Guidance from ENSAC members helped steer the plan's development process and was a valuable component of its revision.

The Fish and Game Council is composed of 11 members, appointed by the governor, with 3 members representing the farming or agricultural community, 6 sportsmen and sportswomen, a public member "knowledgeable in land use management and soil conservation practices," and the Chairman of the ENSAC. The plan was discussed during at least 23 public meetings (2/11/14, 3/11/14, 4/8/14, 6/10/14, 12/16/14, 1/13/15, 2/10/15, 3/3/15, 4/14/15, 5/12/15, 6/9/15, 8/11/15, 10/13/15, 12/15/15, 1/12/16, 3/8/16, 5/10/16, 6/14/16, 7/12/16, 12/13/16, 1/10/17, 2/14/17, 4/11/17), largely to update the Council on revision progress and major decision points and to consider any feedback.

In light of ongoing interactions between shellfish aquaculture and conservation of shorebirds on Delaware Bay, a presentation on the plan and ongoing revisions was also provided to the New Jersey Aquaculture Advisory Council (AAC) at their November 4, 2016, meeting. The AAC is a legislatively established advisory body that provides input on environmentally sound expansion of New Jersey's aquaculture industry.

Additional stakeholder input was obtained through three Action Development workshops that the DFW held in 2015 (and which are described in Chapter 3). These meetings focused on developing actions consistent with the TRACS action lexicon that would address the predominant threats that the DFW had identified. In addition to Executive Committee members, the DFW invited a wide variety of conservation stakeholders including municipal, county, state, and federal government agencies, energy companies, members of academia, nonprofits, and environmental consultants (Appendix L). To target specific interest groups and facilitate their most constructive participation, each of the three meetings were set up around a specific theme: Policy, Land Preservation and Management, and Marine. Stakeholders were encouraged to attend the meeting which best represented their interests and expertise. Combined, more than

125 attendees representing over 45 organizations participated in the workshops, resulting in the collection of valuable data on actions that were expressed as priorities to local and regional conservation interests. The DFW's subsequent analysis and categorization of the data not only helped populate the *Threats to and Conservation Actions for the Focal Species of Greatest Conservation Need* report (Appendix J), but resulted in the creation of action projects that the DFW compiled into a second report, *Projects to Conserve New Jersey's Wildlife Populations of Concern* (Appendix K).

Three American Indian tribal groups are represented on the New Jersey Department of State's Commission on American Indian Affairs:

- Ramapough Lenape Indian Nation, who owns or manages land near Mahwah, Bergen County.
- Nanticoke Lenni-Lenape Tribe, who owns or manages land outside Bridgeton, Cumberland County.
- Powhatan Renape Tribe, who formally managed state-owned land at Rancocas State Park, Burlington County.

In 2011, the DFW made multiple attempts to contact representatives of the these groups, requesting meetings to discuss revisions to the Plan, additional ideas regarding conservation needs, and the Plan's focus and priorities. The DFW received no replies to our solicitations and as a result, no coordination with the Native American community occurred during Plan development. During the formal public comment period in 2017-18, the DFW sent correspondence via certified mail to representatives of the Ramapough Lenape Indian Nation and the Nanticoke Lenni-Lenape Tribe, who continued to own and manage land in the state, to ensure they were aware of the ability to review and provide input on the plan. The DFW received no responses to these mailings.

III. Public Input Process

A. Engaging Public Input during the Revision Process

There have been multiple opportunities for public input during the plan revision process through public comments and personal correspondence.

In early January 2015, the DFW deployed website pages that specifically detailed plan development and progress, and that provided a drop-down menu for submitting comments on each plan section or issue. These pages (http://www.state.nj.us/dep/fgw/ensp/waphome.htm) were available and prominently featured and labeled on both the NJDEP and the DFW home pages. In addition to being available online, each time the web pages were updated or expanded upon, notifications were sent out to members of the public who subscribed to the DFW's e-mail listserv. Because existing subscribers included various print or web media outlets, this also resulted in occasional media coverage. The DFW website provided ongoing opportunities to subscribe to the listserv, and the State Wildlife Action Plan revision page encouraged visitors to subscribe to stay abreast of the process. During the revision process, the DFW received 67 public comments via the website touching on subjects including the purpose and objectives of the plan revision, the selection of SGCN and Focal SGCN, the assessment of threats and actions,

and related general issues. Additional comments deemed unrelated to the Plan or the revision process were forwarded to applicable Bureau's within the DFW.

As was noted above in Section III, the DFW provided 15 updates on the plan revision process and progress at meetings of the Endangered and Nongame Species Advisory Committee (ENSAC) between July 2011 and April 2017 and to the Fish and Game Council 23 times between February 2014 and April 2017. The meetings of the ENSAC and the Fish and Game Council were conducted in accordance with New Jersey's Open Public Meetings Act and consequently, the DFW provided public notice of the dates, times, and agenda items for all meetings online, via the DFW listservs, and by public newspaper notification. Members of the public who attended these meetings provided input on the plan revision process and were invited to monitor the State Wildlife Action Plan website and provide comments by way of that site. The single meeting of the Aquaculture Advisory Committee that covered the plan was similarly conducted pursuant to the state's Open Public Meetings Act.

B. Public comment on the Final Revised Plan

New Jersey solicited public comments on the final version of the revised 2017 Wildlife Action Plan for 40 days, (December 11, 2017 to January 19, 2018). The public comment period was announced via a Department press release, announcement on the DFW's State Wildlife Action Plan web page, via e-mail distributions to a variety of DFW email listservers (estimated to have reached over 2,400 persons), and posting on the DFW's Facebook page. Public announcements appeared in 7 newspapers of regional or local distribution. The announcements directed members of the public to submit comments on the final Plan in much the same manner as comments were requested during plan development. The final Plan, complete with all appendices and attachments, was made available on the DFW's web site, with dedicated web pages for each chapter, appendix or attachment. Members of the public wishing to comment on any specific aspect of the Plan could access the web page dedicated to the section of their interest and utilize an electronic comment submission form to direct targeted comments to the Department for consideration. The DFW received a few additional comments via mail. Table 7 summarizes the sources of public comments received.

Table 7. Sources (as were made available) of Public Comments on the 2017 State Wildlife Action Plan.

Source:	**Details:**
Members of the Public	At least 44 individual persons, the majority of whom submitted multiple comments
Municipal Environmental Commission	One member of a municipal environmental commission provided public comment, though it is not clear if he was officially representing the Commission in said comment
Nonprofit Groups or Organizations	• Delaware Riverkeeper • Friends of Sparta Mountain • NJ Audubon • NJ Conservation Foundation • NJ Division of the Allegheny Society of American Foresters • NJ Forest Watch • NJ Highlands Coalition
Trade Associations or Lobbying Groups	• NJ Builders Association

Table 7 (public comments) continued

Source:	Details:
Academia	• Drew University
State government agencies	• NJ Department of Agriculture • NJ Department of Environmental Protection – DFW • NJ Sports and Exposition Authority
Federal government agencies	• EPA - National Estuary Program • Dept. of the Interior - National Park Service

Comments were received from a total of 44 individual residents, many of whom submitted comments more than once, as well as 19 persons representing affiliated with a total of 14 specific groups, organizations or agencies. While the goal of having public comments submitted via "topic-specific" web page submission forms was to have an immediate "categorization" of comment topics/issues, the DFW found that many of the approximately 150 submissions received included a much greater variety of issues than was the focus of the specific web page used to access the online comment submission form. For obvious reasons, the three additional public comment submissions mailed to the DFW also combined many issues into one submittal. To more efficiently characterize the public comments received and track completion of edits where warranted, the DFW often broke comment submittals apart by "issue" or topic area. As a result, more than 240 issue-oriented public comments were identified and considered with regard to the final 2017 Wildlife Action Plan. Of these comments, approximately 177 were identified as delivering relevant, primarily technical and/or editorial, comments or suggestions. After considering these comments, the DFW found that many helped to improve the Plan by identifying text that was either incorrect, unclear, or required additional information. Some of these comments recommended revisions to, or additions or deletions of threats, actions or "Projects," or identified resources or perspectives that enhanced the DFW's understanding or assessment of pertinent issues. These comments all resulted in valuable contributions to the final Plan. Additional comments were found to be beyond the immediate scope of Plan's development, but will be considered as appropriate during Plan implementation. Many comments received were found not to be directly relevant to the Plan at all, but rather addressed topics related to public hunting and fishing regulations, management, or offered personal perspectives regarding the presence or availability of specific sportfish or game wildlife. Where specific and constructive, these comments have been forwarded to the appropriate DFW section for their information. Lastly, many comments received were found to be strictly editorial in nature and while they informed the DFW as to the many divergent perspectives that exist regarding wildlife and/or wildlife habitat conservation, they provided no tangible, constructive or meaningful input to the 2017 Wildlife Action Plan revision process.

While many of the public comments received were found not to warrant changes to the final version of the Plan, the DFW does feel that many warrant response. Although not required by the US Fish and Wildlife Service, the DFW intends to produce a response document that will aid public understanding of the relevant public comments received on the 2017 Wildlife Action Plan and how they were or will be addressed by DFW. Upon completion in late Spring 2018, the response document will be posted on the DFW Wildlife Action Plan webpage.

This page intentionally left blank

SOURCES

ACJV. 2005. Atlantic Coast Joint Venture Waterfowl Implementation Plan. 93 pp. Available: http://acjv.org/planning/waterfowl-implementation-plan/

AMJV. 2008. Implementation Plan for the Appalachian Mountains Joint Venture: A Foundation for All-bird Conservation for the Region. In: Smith, B.W. (ed.) Appalachian Mountains Joint Venture, Frankfort.

Anderson, J.R., E.E. Hardy, J.T. Roach, and R.E. Witmer. 1976. A land use and land cover classification system for use with remote sensor data. U.S. Geological Survey Professional Paper 964. 28 p

Anderson, M.G. and C.E. Ferree. 2010. Conserving the stage: climate change and geophysical underpinnings of species diversity. PLoS ONE 5(7): e11554.

Anderson, M.G. and A. O. Sheldon. 2011. Conservation Status of Fish, Wildlife, and Natural Habitats in the Northeast Landscape: Implementation of the Northeast Monitoring Framework. The Nature Conservancy, Eastern Conservation Science. 289 pp.

Anderson, M.G., M. Clark, C.E. Ferree, A. Jospe, A. Olivero Sheldon and K.J. Weaver. 2013. Northeast Habitat Guides: A companion to the terrestrial and aquatic habitat maps. The Nature Conservancy, Eastern Conservation Science, Eastern Regional Office. Boston, MA. http://nature.ly/HabitatGuide

Association of Fish and Wildlife Agencies' Guidance Document Work Group. Voluntary Guidance for States to Incorporate Climate Change into State Wildlife Action Plans & Other Management Plans. 2009. Pp. 43.

Atlantic Coast Joint Venture. Draft. Pelagic Bird Conservation: South-Atlantic Migratory Bird Initiative.

Atlantic Flyway Mute Swan Management Plan. 2015. Atlantic Flyway Council. 31 pp.

Ayres, M.P. and M.J. Lombardero. 2000. Assessing the consequences of global change for forest disturbance from herbivores and pathogens. Science of the Total Environment 262:263-286.

Bailey, R.G. 1995. Description of the Ecoregions of the United States. Misc. Publ. No. 1391 (rev), Washington, DC: U.S. Department of Agriculture, Forest Service.

Bale, J.S., G. J. Masters, I. D. Hodkinson, C. Awmack, T. M. Bezemer, V. K. Brown, J. Butterfield, A. Buse, J. C. Coulson, J. Farrar, J. E. G. Good, R. Harrington, S. Hartley, T. H. Jones, R. L. Lindroth, M. C. Press, I. Symrnioudis, A. D. Watt, and J. B. Whittaker. 2002. Herbivory in global climate change research: direct effects of rising temperature on insect herbivores. Global Change Biology 8:1-16.

Bettridge, S. and G. K. Silber. 2008. Update on the United States' actions to reduce the threat of ship collisions with large whales. Prepared for the International Whaling Commission's Working Group on Ship Strikes and Presented at the International Whaling Commission's Conservation Committee, Santiago, Chile, June 16, 2008.

Bick, G.H. 1983. Odonata at risk in conterminous United States and Canada. Odonatologica 12:209-226.

Bolstad, P.V. and W.T. Swank. 1997. Cumulative impacts of land use on water quality in a southern Appalachian watershed. Journal of American Water Resources Association 33:519-533

Both, C. 2006. Climate change and adaptation of annual cycles of migratory birds. Journal of Ornithology 147 (5, Suppl. 1): 68-68.

Bradley, N.L., A.C. Leopold, J. Ross, and W. Huffaker. 1999. Phenological changes reflect climate change in Wisconsin. Proceedings of the National Academy of Sciences, USA. 96:9701-9704.

Broccoli, A.J., M. B. Kaplan, P.C. Loikith, and D.A. Robinson. 2013. State of the Climate: New Jersey. Rutgers Climate Institute, Rutgers University, New Brunswick, NJ. 10 pp.

Brooks, R.T. 2009. Potential impacts of global climate change on the hydrology and ecology of ephemeral freshwater systems of the forests of the northeastern United States. Climatic Change 95:469–483.

Brown, W. S. 1993. Biology, status, and management of the Timber Rattlesnake (*Crotalus horridus)*: A guide for conservation (Joseph T. Collins, ed.). Museum of Natural History – Dyche Hall, The University of Kansas, Lawrence, Kansas. Pp. 10-15.

Brown, S., C. Hickey, B. Harrington, and R. Gill, eds. 2001. The U.S. Shorebird Conservation Plan, 2nd ed. Manomet Center for Conservation Sciences, Manomet, MA. http://www.fws.gov/shorebirdplan/USShorebird/downloads/USShorebirdPlan2Ed.pdf

Butler, C. 2003. The disproportionate effect of climate change on the arrival dates of short-distance migrant birds. Ibis 145: 483-495.

Clapham, P.J., S. B. Young, and R. L. Brownell, Jr. 1999. Baleen Whales: Conservation issues and the status of the most endangered populations. Mammal Review 29:35-60.

Clark, K.E., J.E. Applegate, L.J. Niles, and D.S. Dobkin. 2006. An objective means of species status assessment: Adapting the Delphi Technique. Wildlife Society Bull 34:419-425.

Cooper, M. J. P., M. D. Beevers, M. Oppenheimer. 2008. The potential impacts of sea level rise on the coastal region of New Jersey, USA. Climatic Change . Vol. 90(4):475-492.

Comer, P., D. Faber-Langendoen, R. Evans, S. Gawler, C. Josse, G. Kittel, S. Menard, M. Pyne, M. Reid, K. Schulz, K. Snow, and J. Teague. 2003. Ecological Systems of the United States: A Working Classification of U.S. Terrestrial Systems. NatureServe, Arlington, Virginia

Crespo, E. A. and M. Hall. Interactions between aquatic mammals and humans in the context of ecosystem management. 2002. In: Marine Mammals: Biology and Conservation (Peter G.H. Evans and J.A. Raga, eds.), pp. 463-490. Kluwer Academic/Plenum Publishers, New York.

Crisfield, E. and the Northeast Fish and Wildlife Diversity Technical Committee (NEFWDTC). 2013. The Northeast Lexicon: Terminology Conventions and Data Framework for State Wildlife Action Plans in the Northeast Region. A report submitted to the Northeast Fish and Wildlife Diversity Technical Committee. Terwilliger Consulting, Inc., Locustville, VA. Updated 12/31/2014.

DeCalesta, D. S. 1994. Effect of white-tailed deer on songbirds within managed forests in Pennsylvania. J. Wildlife Management 58:711-718.

Dettmers, R. and K. V. Rosenberg. 2000. Partners in Flight Landbird Conservation Plan: Physiographic Area 9: Southern New England. Version 1.0. Cornell Lab of Ornithology, Ithaca, NY.

Dolman, S.J., M. P. Simmonds, and S. Keith. 2003. Marine wind farms and cetaceans. Annual meeting of the International Whaling Committee. Berlin. IWC/SC/55/E4.

Dunkle, S.W. 2000. Dragonflies Through Binoculars: A Field Guide to Dragonflies of North America. Oxford University Press, Inc. New York, NY. 266 pp.

Ehrenfeld, J. G., P. Kourtev, and W. Huang. 2000. Changes in soil functions following invasions of exotic understory plants in deciduous forests. Ecological Applications, 11:1287-1300.

Erbe, Christine. 2002. Underwater noise of whale-watching boats and potential effects on Killer Whales (Orcinus orca), based on an acoustic impact model. Marine Mammal Science, 18: 394-418.

Forman, R. T. T. 2004. Road ecology's promise: What's around the bend? Environment 46:9-21.

Forman, R. T. T. 1979. Pine Barrens: Ecosystem and Landscape. Rutgers University Press. New Brunswick, NJ.

Forman, R. T. T. and L. E. Alexander. 1998. Roads and their major ecological effect. Annual Review of Ecology and Systematics 29:207-231.

Forman, R. T. T., B. Reineking, and A. M. Hersperger. 2002. Road traffic and nearby grassland bird patterns in a suburbanizing landscape. Environmental Management 29:782-800.

Friesen, L.E., P.F.J. Eagles, and R.J. Mackay. 1995. Effects of residential development on forest-dwelling Neotropical migrant songbirds. Cons. Biol. 9:1408-1414.

Fuller, S.L. 1974. Clams and Mussels (Mollusca:Bivalvia) In: Hart, C.W. Jr. and Fuller, S.L. editors, 1974. Pollution Ecology of Freshwater Invertebrates. Academic Press, NY. Pp. 1-389.

Gawler, S.C., M.G. Anderson, A.P. Olivero, M. Clark. 2008. The Northeast Terrestrial Wildlife Habitat Classification, The Northeast Habitat Classification and Mapping Project Final Report: a report to the Virginia Department of Game and Inland Fisheries on behalf of the Northeast Association of Fish and Wildlife Agencies and the National Fish and Wildlife Foundation. NatureServe. Boston, Massachusetts

Gibbs, J.P. and A. R. Breisch. 2001. Climate warming and calling phenology of frogs near Ithaca, New York, 1900-1999. Conservation Biology 15:1175-1178.

Glass, A. H.,T. V. N. Cole, M. Garron, R. L. Merrick, and R. M. Pace. 2008. Mortality and serious injury determinations for Baleen Whale stocks along the United States eastern seaboard and adjacent Canadian Maritimes, 2002-2006. Northeast Fisheries Science Center Document 08-04.

Goudreau, S.E. 1988. Effects of sewage treatment plant effluent on mollusks and fish of the Clinch River in Tazewell County, Virginia. M.S. Thesis, VA Polytechnic and State University.

Goudreau, S.E., R. J. Neves, and R.J. Sheehan. 1993. Effects of wastewater treatment plant effluents on freshwater mollusks in the upper Clinch River, Virginia, USA. Hydrobiologia 252:211-230.

Hall, M., and G. P. Donovan. 2002. Environmentalists, fishermen, cetaceans and fish: Is there a balance and can science help to find it? In: Marine Mammals: Biology and Conservation (P.G.H. Evans and J.A. Raga, eds.), pp. 491-522. Kluwer Academic/Plenum Publishers, New York.

Herring, S.C., A. Hoell, M.P. Hoerling, J.P. Kossin, C.J. Schreck III, and P.A. Stott, Editors. 2016. Explaining extreme events of 2015 from a climate perspective. Bulletin of the American Meteorological Society 97(12):S1–S145.

Hoffmann, E., S. Ford, E. Powell, and J. Klinck. 2001. Modeling studies of the effect of climate variability on MSX disease in eastern oyster (*Crassostrea virginica*) populations. Hydrobiologia 460:195-212.

Hoverter, S.P. 2012. Adapting to Urban Heat: A Tool Kit for Local Governments, Georgetown Climate Center. http://www.georgetownclimate.org/resources/adapting-to-urban-heat-a-tool-kit-for-local-governments

Hunter, W. C., W. Golder, S. Melvin, and J. Wheeler. 2006. Southeast United States Regional Waterbird Conservation Plan. Available: http://www.pwrc.usgs.gov/nacwcp/southeast_us.html. Accessed 01/25/17.

IUCN 2009. 2009 IUCN Red List of Threatened Species. <www.iucnredlist.org>. Downloaded on 19 March 2010.

IUCN 2016. The IUCN Red List of Threatened Species, 2016. Available: http://www.iucnredlist.org/. Accessed 01/25/17.

Jensen, A. and G. K. Silber. 2004. Large whale ship strike database. NOAA Technical Memorandum NMFS-OPR-25.

Johnson, A., G. Salvador, J. Kenney, J. Robbins, S. Kraus, S. Landry, and P. Clapham. 2005. Fishing gear involved in entanglements of right and humpback whales. Marine Mammal Science 21:635–645.

Juelg, G.R. 2002. The New Jersey Pinelands Threatened and Endangered Species. Pineland Preservation Alliance, Southampton, NJ.

Kearney, R. F. 2003. Partners in Flight Landbird Conservation Plan Physiographic Area 10: Mid-Atlantic Piedmont. Version 1.0. Cornell Lab of Ornithology, Ithaca, NY.

Keys, Jr., J.E., C.A. Carpenter, S. Hooks, F. Koenig, W.H. McNab, W. Russell, and M.L. Smith. 1995. Ecological Units of the Eastern United States – First Approximation. Atlanta, Georgia: U.S. Department of Agriculture, Forest Service.

Knowlton, A. R., and S. D. Kraus. 2001. Mortality and serious injury of northern right whales (*Eubalaena glacialis*) in the western North Atlantic. Journal of Cetacean Research and Management (Special Issue) 2:193–208.

Kopp, R.E., A. Broccoli, B. Horton, D. Kreeger, R. Leichenko, J.A. Miller, J.K. Miller, P. Orton, A. Parris, D. Robinson, C.P. Weaver, M. Campo, M. Kaplan, M. Buchanan, J. Herb, L. Auermuller and C. Andrews. 2016. Assessing New Jersey's Exposure to Sea-Level Rise and Coastal Storms: Report of the New Jersey Climate Adaptation Alliance Science and Technical Advisory Panel. Prepared for the New Jersey Climate Adaptation Alliance. New Brunswick, New Jersey: Rutgers University.

Kopp, R. E., R.M. Horton, C.M. Little, J.X. Mitrovica, M. Oppenheimer, D.J. Rasmussen, Strauss, B.H., C. Tebaldi. 2014. Probabilistic 21st and 22nd century sea-level projections at a global network of tide-gauge sites. Earth's Future, 2(8), 383–406. http://doi.org/10.1002/2014EF000239.

Kushlan, J. A., M. J. Steinkamp, K. C. Parsons, J. Capp, M. A. Cruz, M. Coulter, I. Davidson, L. Dickson, N. Edelson, R. Elliot, R. M. Erwin, S. Hatch, S. Kress, R. Milko, S. Miller, K. Mills, R. Paul, R. Phillips, J. E. Saliva, B. Sydeman, J. Trapp, J. Wheeler, and K. Wohl. 2002. Waterbird Conservation for the Americas: The North American Waterbird Conservation Plan, Version 1. Waterbird Conservation for the Americas. Washington, DC, U.S.A., 78pp. www.waterbirdconservation.org.

Lathrop, R. G. 2000. New Jersey Land Cover Change Analysis Project. Center for Remote Sensing & Spatial Analysis, Cook College, Rutgers University, New Brunswick, NJ. October 2000. 34 pp.

Lathrop, R. G., and J. A. Bognar. 2016. Changing landscapes in the Garden State: Land use change in NJ 1986 thru 2012. Grant F. Walton Center for Remote Sensing & Spatial Analysis, Rutgers University, New Brunswick, NJ. Available: http://crssa.rutgers.edu/projects/lc/download/reports/NJ_Urb_Growth_III_executive_summary_2012_LathropHasse.pdf. Accessed: 01/25/17.

Layzer, J.B., M.E. Gorden and R.M. Anderson. 1993. Mussels: the forgotten fauna of regulated rivers – a case study of the Caney Fork River. Regul. Rivers. Res. Manag. 8:63-71.

Logan, J.A. and J.A. Powell. 2001. Ghost forests, global warming and the mountain pine beetle (*Coleoptera: Scolytidae*). American Entomologist 47:160-173.

Logan, J.A., J. Regniere, and J.A. Powell. 2003. Assessing the impacts of global warming on forest pest dynamics. Frontiers in Ecology and Environment 1:130-137.

MANEM Waterbird Working Group. 2006. Waterbird Conservation Plan for the Mid-Atlantic/New England/Maritime Region: 2006-2010. Waterbird Conservation for the Americas (www.waterbirdconservation.org).

Margoluis, R., C. Stem, V. Swaminathan, M. Brown, A. Johnson, G. Placci, N. Salafsky, and I. Tilders. 2013. Results chains: a tool for conservation action design, management, and evaluation. Ecology and Society 18(3): 22.

Marine Mammal Commission. 2007. The Marine Mammal Protection Act of 1972 As Amended.

McMahon, R.F. 1983. Ecology of an invasive pest bivalve, Corbicula. Pp 505-561 In: W.D. Russell-Hunter, ed. The Mollusca, Vol. 6, Ecology. Academic Press, Inc. NY.

Millar, C.I., N.L. Stephenson, and S.L. Stephens. 2007. Climate change and forests of the future: Managing in the face of uncertainty. Ecological Applications 17:2145-2151.

Moyle, P.B. and P.J. Randall. 1998. Evaluating the biotic integrity of watersheds in the Sierra Nevada, California. Conservation Biology 12:1318-1326.

Musick, J.A., M.M. Harbin, S.A. Berkeley, G.H. Burgess, A.M. Eklund, L. Findley, R.G. Filmore, J.T. Golden, D.S. Ha, G.R. Huntsman, J.C. McGovern, S.J. Parker, S.G. Poss, E.

Sala, T.W. Schmidt, G.R. Sedberry, J. Weeks, and S.G. Wright. 2000. Marine estuarine and diadromous fish stocks at risk of extinction in North America (exclusive of pacific salmonids). Fisheries 25(11):6-30.

National Marine Fisheries Service. 1991. Recovery plan for the Humpback Whale (*Megaptera novaeangliae*). Prepared by the Humpback Whale Recovery Team for the National Marine Fisheries Service, Silver Spring, Maryland. 105 pp.

National Park Service. 2004. "Delaware Water Gap National Recreation Area." Available: http://www.nps.gov/dewa/ Accessed: 01/25/17.

National Oceanic and Atmospheric Administration. 2016. Global Analysis-Annual Report. Available: https://www.ncdc.noaa.gov/sotc/global/201613. Accessed 1/25/2017.

National Wildlife Federation and Manomet Center for Conservation Sciences. 2014. The vulnerabilities of northeastern fish and wildlife habitats to sea level rise. A report to the Northeastern Association of Fish and Wildlife Agencies and the North Atlantic Landscape Conservation Cooperative, Plymouth, MA. 55 pp.

Nature's Network. 2017. Regional Conservation Opportunity Areas mapping. Available: www.naturesnetwork.org. Accessed 6/12/2017.

NatureServe. 2004. "NatureServe Explorer: An Online Encyclopedia of Life." Available: http://www.natureserve.org/explorer/ Accessed: 04/15/04, 11/15/04.

NatureServe. 2009. NatureServe Conservation Status Assessment: Methodology for Assigning Ranks. Available: http://www.natureserve.org/publications/ConsStatusAssess_RankMethodology.pdf. Accessed July 13, 2010.

NatureServe. 2016. NatureServe's Central Databases. Arlington, VA. U.S.A.

NatureServe. 2017. Biotics 5.9 database. New Jersey Natural Heritage Program, Trenton, NJ.

Nelson, M., M. Garron, R. L. Merrick, R. M. Pace, and T. V. N. Cole. 2007. Mortality and serious injury determinations for Baleen Whale stocks along the United States eastern seaboard and adjacent Canadian Maritimes, 2001-2005. Northeast Fisheries Science Center Document 07-05.

NEPARC. 2010. Northeast Amphibian and Reptile Species of Regional Responsibility and Conservation Concern. Northeast Partners in Amphibian and Reptile Conservation (NEPARC). Publication 2010-1.

NJCAA. 2014a. A summary of climate change impacts and preparedness opportunities for the coastal communities in New Jersey. New Jersey Climate Adaptation Alliance. April 2014. Accessed online 5/30/2017 at http://njadapt.rutgers.edu/docman-lister/working-briefs/108-njcaa-coastal-communities/file.

NJCAA. 2014b. A summary of climate change impacts and preparedness opportunities for the affecting natural resources in New Jersey. New Jersey Climate Adaptation Alliance. March 2014. Accessed online 5/30/2017 at http://njadapt.rutgers.edu/docman-lister/working-briefs/106-njcaa-natural-resources/file.

New Jersey Comparative Risk Steering Committee. 2003. Final Report of the New Jersey Comparative Risk Project. Rubenstein, D. and Telford, S. co-chairs. 191 pp. + appendices.

New Jersey Department of Environmental Protection. 2013. Climate change in New Jersey: Trends in temperature and sea level. Environmental Trends Report, NJDEP office of Science. Accessed online 5/30/17 at http://www.nj.gov/dep/dsr/trends/pdfs/climate-change.pdf.

New Jersey Department of Environmental Protection (NJDEP). 2003. Final Report of the New Jersey Comparative Risk Project. Available at: http://www.state.nj.us/dep/dsr/njcrp/

New Jersey Division of Fish and Wildlife. 1991. Fish Health Management Plan. Federal Aid Project F-35-R-NJ. Job I-3, "Fish Disease and Parasite Investigations."

New Jersey Division of Fish and Wildlife. 2004. Coldwater Fisheries Management Plan. Federal Aid Project F-48-R-NJ, Job II-6, "Investigations and Management of New Jersey's Freshwater Resources."

New Jersey Natural Heritage Program. 2010. List of Endangered Plant Species and Plant Species of Concern, June 2016. NJDEP, New Jersey Natural Heritage Program, Trenton, NJ. http://www.nj.gov/dep/parksandforests/natural/heritage/njplantlist.pdf.

New Jersey Division of Fish and Wildlife. 2012. New Jersey Landscape Project, Version 3.1. New Jersey Department of Environmental Protection, Division of Fish and Wildlife, Endangered and Nongame Species Program. pp. 33. Available: http://njfishandwildlife.com/ensp/landscape/lp_report_3_1.pdf.

NJ Department of Environmental Protection. 2016. "NJDEP Division of Fish & Wildlife – Endangered and Nongame Species Program." Available: http://www.nj.gov/dep/fgw/ensphome.htm Accessed: 01/25/17.

NJ Department of Labor. 2010. "Census 2010 Data for New Jersey." Available: http://lwd.dol.state.nj.us/labor/lpa/census/Census_index.html. Accessed 01/25/17.

NJ Geologic Survey. 2017. "The Geology of New Jersey." Available: http://www.nj.gov/dep/njgs/ Accessed: 01/25/17.

NJ Palisades Interstate Park Commission. 2016. "Palisades Interstate Park – NJ Section." Available: http://www.njpalisades.org/ Accessed: 01/25/17.

NJ Pinelands Commission. 2016. "New Jersey Pinelands Commission Home Page." Available: http://www.nj.gov/pinelands/ Accessed: 01/25/17.

North American Waterfowl Management Plan. 2012. North American Waterfowl Management Plan 2012: People conserving waterfowl and wetlands. Canadian Wildlife Service, US Fish and Wildlife Service, Secretaria de Medio Ambiente y Recursos Naturales, 70 pp. Available: https://www.fws.gov/birds/management/bird-management-plans/north-american-waterfowl-management-plan/plan-documents.php

Northeast Endangered Species and Wildlife Diversity Technical Committee. 1999. Wildlife species of regional conservation in the northeastern United States. Northeast Wildlife 54:93-100.

Office of the NJ State Climatologist. 2016. Monthly climate tables. Trenton, NJ. Available: http://climate.rutgers.edu/stateclim_v1/nclimdiv/index.php?stn=NJ00&elem=avgt. Accessed 01/25/17.

Panjabi, A. O., E. H. Dunn, P. J. Blancher, W. C. Hunter, B. Altman, J. Bart, C. J. Beardmore, H. Berlanga, G. S. Butcher, S. K. David, D. W. Demarest, R. Dettmers, W. Easton, H. Gomez de Silva Garza, E. E. Inigo-Elias, D. N. Pashley, C. J. Ralph, T. D. Rich, K. V. Rosenberg, C. M. Rustay, J. M. Ruth, J. S. Wendt, and T. C. Will. 2005. The Partners in Flight handbook on species assessment. Version 2005. Partners in Flight Technical Series No. 3. Rocky Mountain Bird Observatory website: http://www.rmbo.org/pubs/downloads/Handbook2005.pdf

Parker, B.L., M. Skinner, S. Goulli, T. Ashikaga, and H.B. Teillon. 1999. Low lethal temperature for hemlock wooly adelgid (*Homoptera: Adelgidae*). Environmental Entomology 28: 1085-1091.

Pettigrew, L. 1998. The New Jersey Wildlife Viewing Guide. Falcon Publishing, Inc., Helena, Montana.

Petzinger, S. In progress. *Forest Management Guidelines for Species of Conservation Concern in New Jersey*. New Jersey Department of Environmental Protection, Division of Fish and Wildlife, Endangered and Nongame Species Program.

Petzinger, S. In progress. *Wetland Buffer Guidelines for Species of Conservation Concern in New Jersey*. New Jersey Department of Environmental Protection, Division of Fish and Wildlife, Endangered and Nongame Species Program.

Picatinny Arsenal (PICA). 2015. Integrated Natural Resources Management Plan. Prepared in conjunction with U.S. Army Environmental Command. February. 414 pp.

Pinchot Institute for Conservation. 2015. Building Resilience in the Upper Delaware River Region. Washington, DC. 16 p.

Pinsky, M.L., and N.J. Mantua. 2014. Emerging adaptation approaches for climate-ready fisheries management. Oceanography 27:146–159, http://dx.doi.org/10.5670/oceanog.2014.93

Reijnen, R., R. Foppen, C. Ter Braak, and J. Thissen. 1995. The effects of car traffic on breeding bird populations in woodland. III. Reduction of density in relation to the proximity of main roads. Journal of Applied Ecology 32:187-202.

Reinert, H. K. and R. T. Zappalorti. 1988. Timber Rattlesnakes (*Crotalus horridus*) of the Pine Barrens: Their Movement Patterns and Habitat Preference. Copeia 4:964-978.

Rich, A. C., D. S. Dobkin, and L. J. Niles. 1994. Defining forest fragmentation by corridor width: The influence of narrow forest-dividing corridors on forest-nesting birds in southern New Jersey. Conservation Biology 8:1109-1121.

Rich, T. D., C. J. Beardmore, H. Berlanga, P. J. Blancher, M. S. W., Bradstreet, G. S. Butcher, D. W. Demarest, E. H. Dunn, W. C. Hunter, E.E. Inigo-Elias, J. A. Kennedy, A. M. Martell, A. O. Panjabi, D. N. Pashley, K. V. Rosenberg, C. M. Rustay, J. S. Wendt, T. C. Will. 2004, Partners in Flight North American Landbird Conservation Plan. Cornell Lab of Ornithology. Ithaca, NY. 85pp.

Root, T.L., T. Price, K.R. Hall, S.H. Schneider, C. Rosenzweig & J.A. Pounds. 2003. Fingerprints of global warming on wild animals and plants. Nature 421: 57-60.

Rosenberg, K.V. and B. Robertson. 2003. Partners in Flight Landbird Conservation Plan: Physiographic Area 17: Northern Ridge and Valley. Version 1.1. Cornell Lab of Ornithology, Ithaca, NY.

Rosenberg, K.V., J.A. Kennedy, R. Dettmers, R.P. Ford, D. Reynolds, J.D. Alexander, C.J. Beardmore, P.J. Blancher, R.E. Bogart, G.S. Butcher, A.F. Camfield, A. Couturier, D.W. Demarest, W.E. Easton, J.J. Giocomo, R.H. Keller, A.E. Mini, A.O. Panjabi, D.N. Pashley, T.D. Rich, J.M. Ruth, H. Stabins, J. Stanton, T. Will. 2016. Partners in Flight Landbird Conservation Plan: 2016 Revision for Canada and Continental United States. Partners in Flight Science Committee. http://www.partnersinflight.org/plans/landbird-conservation-plan/

Roth, N.E., Allen, J.D. and D.L. Erickson. 1996. Landscape influences on stream biotic integrity assessed at multiple scales. Landscape Ecology 11:141-156.

SaintOurs, F.H. 2002. Drainage to dragonflies: conservation of aquatic invertebrates in rivers and streams of eastern Massachusetts. Conservation Perspectives – the Online Journal of NESCB. Fall issue.

Salafsky, N., D. Salzer, A.J. Stattersfield, C. Hilton-Taylor, R. Neugarten, S.H.M. Butchart, B. Collen, N. Cox, L.L. Master, S. O'Connor, and D. Wilkie. 2008. A Standard Lexicon for

Biodiversity Conservation: Unified Classifications of Threats and Actions. Society for Conservation Biology 22(4):897-911.

Sallenger Jr. A.H., K. S. Doran, P. A. Howd. 2012. Hotspot of accelerated sea-level rise on the Atlantic coast of North America, Nature Climate Change. http://www.nature.com/nclimate/journal/v2/n12/full/nclimate1597.html

Snyder, D. 2010. Personal Communication: Rare Plant Species Habitats in New Jersey. NJDEP, New Jersey Natural Heritage Program, Trenton, NJ.

Sourland Planning Council. 2004. "Sourland Planning Council Home Page." Available: www.sourland.org Accessed: 04/15/04].

Staudinger, M. D., T. L. Morelli, and A. M. Bryan. 2015. Integrating Climate Change into Northeast and Midwest State Wildlife Action Plans. DOI Northeast Climate Science Center Report, Amherst, Massachusetts. 205 pp

Steinkamp, M. 2007. New England/Mid-Atlantic Coast Bird Conservation Region (BCR30) Implementation Plan.

Steinkamp, M. 2008. BCR 29 Priority Bird Species (final draft 02.05.08)

Stenseth, N.C. and A. Mysterud. 2002. Climate, changing phenology, and other life history traits: non-linearity and match-mismatch to the environment. Proceedings of the National Academy of Sciences 99: 13379-13381.

Stocker, T.F., D. Qin, G. K. Plattner, M. Tignor, S. Allen, and P.M. Midgley (eds.) 2010. Report of the Intergovernmental Panel on Climate Change (IPCC) Workshop on Sea-Level Rise and Ice Sheet Instabilities. IPCC Working Group I Technical Support Unit, University of Bern, Bern, Switzerland.

Sweet, W., C. Zervas, S. Gill and J. Park. 2013. Hurricane Sandy inundation probabilities today and tomorrow [in "Explaining Extreme Events of 2012 from a Climate Perspective"]. Bulletin of the American Meteorological Society, 94, S17-S20, http://www.ametsoc.org/2012extremeeventsclimate.pdf

Tran, J.K., Ylioja, T., Billings, R.F., Regniere, J., Ayres, M.P. 2007. Impacts of minimum winter temperatures on the population of Dendroctonus frontalis. Ecol. Appl. 17, 882-899.

Terwilliger Consulting, Inc. and the Northeast Fish and Wildlife Diversity Technical Committee. 2015. Taking Action Together: Northeast Regional Synthesis for State Wildlife Action Plans. A report submitted to the Northeast Fish and Wildlife Diversity Committee. Locustville, VA.

Trombulak, S.C. and C.A. Frisell. 2000. Review of ecological effects of roads on terrestrial and aquatic communities. Conservation Biology 14(1):18-30.

USDA Forest Service. 2004. "Exploring the Highlands – USDA Forest Service." Available: http://www.fs.fed.us/na/highlands/explore/explore.html Accessed: 04/15/04].

USDA Forest Service, Northern Research Station. 2016. Forest Adaptation Resources: climate change tools and approaches for land managers, 2nd ed. Gen. Tech. Rep. NRS-GTR-87-2. Newtown Square, PA. 161 p.

U.S. Fish and Wildlife Service, 1996. Piping Plover *(Charadrius melodus),* Atlantic Coast Population, Revised Recovery Plan. Hadley, MA. 258 pp.

U.S. Fish and Wildlife Service. 1999. Agency Draft Indiana Bat (Myotis sodalis) Revised Recovery Plan. Fort Snelling, Minnesota. 53 pp.

U.S. Fish and Wildlife Service. 2008. Birds of Conservation Concern 2008. United States Department of Interior, Fish and Wildlife Service, Division of Migratory Bird Management, Arlington, Virginia. 85 pp Available: www.fws.gov/migratorybirds/

U.S. Fish and Wildlife Service. 2012. North Atlantic Waterfowl Management Plan. Division of Migratory Bird Management, Arlington, VA.

U.S. Fish and Wildlife Service. 2004. "Cape May National Wildlife Refuge, U.S. Fish and Wildlife Service." Available: www.fws.gov/refuge/cape_may. Accessed: 01/25/17.

U.S. Fish and Wildlife Service. 2004. "Edwin B. Forsythe National Wildlife Refuge, U.S. Fish and Wildlife Service." Available: www.fws.gov/refuge/edwin_b_forsythe. Accessed: 01/25/17.

U.S. Fish and Wildlife Service. 2014. "Great Swamp National Wildlife Refuge." Available: www.fws.gov/refuge/great_swamp. Accessed: 01/25/17.

U.S. Fish and Wildlife Service. 2011. "Supawna Meadows National Wildlife Refuge." Available: www.fws.gov/refuge/supawna_meadows. Accessed: 01/25/17.

U.S. Fish and Wildlife Service. 2009. "Wallkill National Wildlife Refuge." Available: www.fws.gov/refuge/wallkill_river. Accessed: 01/25/17.

U.S. Fish and Wildlife Service. 2014. Tracking and Reporting Actions for the Conservation of Species (TRACS) Reference Materials: Action Levels with Indicators. Available: https://tracs.fws.gov/learning/mod/folder/view.php?id=41. Accessed: 6/1/2017.

U.S. Global Change Research Program (USGCRP). 2009. Global climate change impacts in the U.S. Cambridge University Press, New York. Pp. 107-110.

U.S. Global Change Research Program. 2014. National Climate Assessment. http://nca2014.globalchange.gov/report

VanLuven, D. 2015. Climate Change Summary for the NJ Wildlife Action Plan. Unpubl. report to the NJ Division of Fish and Wildlife, Trenton.

Visser, M.E., C. Both, and M.M. Lambrechts. 2004. Global climate change leads to mistimed avian reproduction. Advances in Ecological Research 35: 89-110.

Visser ME, and C. Both. 2005. Shifts in phenology due to global climate change: the need for a yardstick. Proceedings of the Royal Society of London Series B-Biological Sciences 272: 2561–2569.

Wang, L., Lyons, J. and R. Gatti. 1997. Influences of watershed land use on habitat quality and biotic integrity in Wisconsin streams. Fisheries 22(6):6-12.

Watson, C. and K. Malloy. 2006. The South Atlantic Migratory Bird Initiative Implementation Plan, Version 3.1.99 pp.

Watts, B. D. 1999. Partners in Flight: Mid-Atlantic Coastal Plain Bird Conservation Plan: Physiographic Area #44. Version 1.0. Cornell Lab of Ornithology, Ithaca, NY.

Weed, A.S., M. P. Ayers, J. A. Hicke. 2013. Consequences of climate change for biotic disturbances in North American forests. Ecol. Monogr. 83:441-470.

Whelan, R.J. 1995. The Ecology of Fire. Cambridge University Press. Cambridge, UK.

Williams, J.D., M. L. Warren, K. S. Cummings, J. L. Harris. and R.J. Neves. 1993. Conservation status of freshwater mussels of the United States and Canada. Fisheries 18(9):6-22.

Zampella, R.A., J.F. Bunnell, K.J. Laidig, and C.L. Dow. 2001. The Mullica River Basin: A Report to the Pinelands Commission on the status of the landscape and selected aquatic and wetland resources. Pinelands Commission, New Lisbon, NJ.

This page intentionally left blank

Appendix A: Criteria for Selecting Species of Greatest Conservation Need

Criteria for Selecting Species of Greatest Conservation Need

State Wildlife Action Plans are focused on the conservation of species and habitats in an effort to prevent them from becoming more rare and costly to protect or restore. As such, each state is required to identify the species of greatest conservation need (SGCN) and their habitats within the state that require conservation efforts to ensure their future.

Species of Greatest Conservation Need (SGCN) are those species that through a combination of low and/or declining populations or vulnerability to threats, particularly anthropogenic threats, are considered to be at risk of becoming extinct, extirpated, endangered, or threatened. SGCN in New Jersey span taxonomic groups including birds, marine and terrestrial mammals, reptiles, amphibians, fish and several invertebrate groups. To provide a transparent and clearly defined mechanism for identifying SGCN in New Jersey, the Division of Fish and Wildlife (DFW) decided to use the efforts of agencies and organizations who classify species' relative risk of imperilment. Below we provide references the DFW has used for each taxonomic group and the categories within those references that we believe warrant a species to be considered an SGCN in New Jersey if the species meets one or more of the criteria. In addition to these references and criteria, we have also made use of published evaluations that have been performed for specific taxonomic groups. The tables below contain the references/sources, criteria, and justifications for each taxonomic group.

Table 1. Criteria that applies to all taxonomic groups for selecting SGCN.

Species suite	Source	Rank	Justification
All taxonomic groups	US Fish and Wildlife Service (USFWS)	Endangered	USFWS implements a rulemaking/regulatory procedure to assess a species' population status including those meeting the definition of Endangered or Threatened and soliciting biological information regarding Candidate species that will contribute to their status review. Endangered and Threatened species have been included as they have been found to be "in danger of extinction throughout all or a significant portion of its range or are likely to become endangered within the foreseeable future throughout all or a significant portion of its range." "*Candidate* species are plants and animals for which the U.S. Fish and Wildlife Service (FWS) has sufficient information on their biological status and threats to propose them as endangered or threatened under the Endangered Species Act (ESA), but for which development of a proposed listing regulation is precluded by other higher priority listing activities. The National Marine Fisheries Service (NMFS), which has jurisdiction over most marine species, also maintains a list of 'species of concern' for which more information is needed before they can be proposed for listing" (FWS, 2011) Additional information regarding candidate species can be found at the following websites: USFWS jurisdiction: http://ecos.fws.gov/tess_public/pub/candidateSpecies.jsp NMFS (NOAA) jurisdiction: http://www.nmfs.noaa.gov/pr/species/esa/candidate.htm
		Threatened	
		Candidate Species	

(Table 1 continued)

Species suite	Source	Rank	Justification
All taxonomic groups	NJ Division of Fish and Wildlife	Endangered (with NatureServe Conservation Status S1)	New Jersey has adapted and implements the Delphi Status Review (or Delphi Technique) to determine the relative endangerment or stability of a species' population. A systematic method for reaching consensus among experts, the Delphi Technique is an iterative process characterized by anonymity among the participating experts and controlled feedback via the principal investigator. The results of this status assessment are used to assign the legal status of species in the state. Endangered (E), Threatened (T) and Special Concern (SC) species are included as they represent those species that warrant special attention due to their limited population and success as a result of numerous threats contributing to their continued decline. (NatureServe species' ranks S1 (critically imperiled), S2 (imperiled), or S3 (vulnerable) align with New Jersey's endangered, threatened and special concern status, respectively, except for those that have not been reviewed using the Delphi Technique.) "Candidate" species include those species that have been reviewed by the Delphi process and have been recommended for listing as E, T, SC or U.
		Threatened (with NatureServe Conservation Status S2)	
		Special Concern (with NatureServe Conservation Status S3)	
		Candidate Species	
	NatureServe	Conservation Status G1, Critically Imperiled	NatureServe assigns global and regional (i.e., national/subnational) species' ranks by "researching and recording information on a set of conservation status factors. The protocol for assigning a conservation status rank is based on scoring an element against ten conservation status factors, which are grouped into three categories based on the characteristic of the factor*: rarity (six factors), trends (two factors), and threats (two factors). G3 is the lowest global rank contributing to NJ's SGCN list. These include species that are at a "moderate risk of extinction or elimination due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors." N3 is the lowest regional (i.e., national/subnational) rank contributing to NJ's SGCN list. Similar to G3 but more localized, these include species that are at a "moderate risk of extirpation in the jurisdiction due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors."
		Conservation Status G2, Imperiled	
		Conservation Status G3, Vulnerable	
		National Conservation Status Rank (N1), Critically Imperiled	
		National Conservation Status Rank (N2), Imperiled	
		National Conservation Status Rank (N3), Vulnerable	

(Table 1 continued)

Species suite	Source	Rank	Justification
All taxonomic groups	IUCN Red List	Critically Endangered	The IUCN Red List is a "system for classifying species at high risk of global extinction." The process for qualifying species is extensive.** Taxon valued as *Critically Endangered, Endangered and Vulnerable* have been assessed based on the reduction of the population's size, the geographic range of the species and the probability of extinction based on quantitative analysis. A taxon is *Near Threatened* when it has been "evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future." (IUCN website, 01/23/13) As such, NJ has included these species as SGCN.
		Endangered	
		Vulnerable	
		Near Threatened	

* To read more about NatureServes Conservation Status Assessments, Methodology for Assigning Ranks, please visit their website:
http://www.natureserve.org/publications/ConsStatusAssess_RankMethodology.jsp

** IUCN Red List parameters for qualifying species is extensive. For more information, please visit their website:
http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria#definitions

Table 2. Additional species information that was used to develop criteria for the selection of SGCN mammals.

Species suite	Source	Rank	Justification
Terrestrial	In surrounding states (PA[1], NY[2], DE[3], MD[4] and CT) [5]	Endangered, Threatened or Special Concern	The listing process in each surrounding state varies, but in each state a committee of experts is assembled to evaluate extinction risk of each species. There are no regional priority lists for terrestrial species so the status of species in surrounding states is being used as a surrogate for that information to incorporate species of conservation concern in the region.
	In surrounding states (PA, NY, DE, MD and CT)	NatureServe rank S1-S3	Includes species ranked as S1 (critically imperiled), S2 (imperiled), or S3 (vulnerable) in states surrounding NJ. These state ranks are determined by each state using methods developed by NatureServe*, and are based on the best available information and consider a variety of factors such as species abundance, distribution, population trends and threats. NatureServe state rank procedures often have different criteria, evidence requirements, purposes and taxonomic coverage than state lists of endangered and threatened species. There are no regional priority lists for terrestrial mammal species so the status of species in surrounding states is being used as a surrogate for that information to identify species of conservation concern in the region.
Marine	NOAA Fisheries	Candidate species for NJ waters	NOAA is the federal authority with jurisdiction over marine mammals. Candidate species are those petitioned species that are actively being considered for E or T status, as well as those for which NMFS has initiated an ESA status review. Proposed species are candidate species that were found to warrant listing as either T or E and were proposed as such in the Federal Register after completion of a status review. Species of Concern are those about which NMFS has some concern regarding status and threat, but for which insufficient information is available under the ESA.
		Proposed species for NJ waters	
		Species of Concern for NJ waters	

*http://www.natureserve.org/explorer/ranking.htm

[1] http://www.portal.state.pa.us/portal/server.pt?open=514&objID=622722&mode=2

[2] http://www.dec.ny.gov/docs/wildlife_pdf/2007_animal_list.pdf

[3] http://www.dnrec.delaware.gov/fw/NHESP/information/Pages/Endangered.aspx?as_sitesearch=http%3A%2F%2Fwww.dnrec.delaware.gov&q=delaware+threatened+species

[4] http://www.dnr.state.md.us/wildlife/Plants_Wildlife/rte/pdfs/rte_Animal_List.pdf

[5] http://www.ct.gov/dep/lib/dep/wildlife/pdf_files/nongame/ets10.pdf

Table 3. Additional species information that was used to develop criteria for the selection of SGCN birds.

Species suite	Source	Rank	Justification
All birds	Listed by USFWS in the most recent Birds of Conservation Concern for Bird Conservation Region (BCR) 28, 29, or 30*	All birds on list who winter, breed, and/or migrate through NJ	The USFWS maintains the Birds of Conservation Concern list of non-hunted birds in the US to represent their highest conservation priorities. This list is separated by BCR and season (breeding and non-breeding). Therefore, any species of bird designated as conservation concern in the BCRs that occurs in NJ (28, 29, 30) is included as long as the species occurs in NJ during the season it is designated as conservation concern.
	South Atlantic Migratory Bird Implementation Plan (2006)	High (rank)	Species meeting these criteria are continental or regional concern in need of management attention, not just monitoring, in the regional and/or national plans for each bird species group. While the focus of this plan is south of NJ, it prioritizes many species that occur in NJ as being important in coastal areas for breeding, wintering, and/or migration.
		Highest (rank)	
	BCR 30* All-bird Plan (2007)	High (rank)	Species meeting these criteria are ranked high for continental concern, BCR concern, and/or BCR responsibility. The ranking is based upon decision-rules and BCR-specific information provided in the continental and regional plans produced by the bird initiatives, State Wildlife Action Plans, results from previous workshops held by bird conservation initiatives, and results from the December 2004 BCR 30 All-bird Workshop.
		Highest (rank)	
All birds	[Most recent draft of the] BCR29* all-bird species list	High (rank)	Species meeting these criteria are continental concern, BCR concern, and/or BCR responsibility. This ranking is based upon species requiring serious and/or immediate attention.
		Highest (rank)	
	[Most recent draft of the] BCR28* all-bird species list	High (rank)	Species meeting these criteria require serious and/or immediate attention for either breeding or non-breeding populations. Ranking is based upon a summary of international, national, and regional plans, a conglomeration of listing in SWAPs in the AMJV region, and recommendations from the BCR 28 technical committee.
		Highest (rank)	

* More information about Bird Conservation Regions can be found at http://nabci-us.org/resources/bird-conservation-regions/

(Table 3 continued)

Species suite	Source	Rank	Justification
Landbirds	Most recent Partners in Flight breeding and/or non-breeding scores for BCRs 28, 29, or 30*	Regional concern status	Species meeting these criteria are designated as regional concern and included because of high population threats. Species ranked solely because of high relative density were removed from the list.
	Continental Watch List, Eastern Biome Watch List, or Northern Forest Biome Watch List (non-breeding status only) per the Partners in Flight National Landbird Conservation Plan (2004)	All birds on list who winter, breed, and/or migrate through NJ	Species meeting these criteria are on the Watch List and rank high because of high population threats, restricted distributions, and/or declining population trends. Northern Forest Biome was used to include SGCN species that migrate through or winter in NJ.
Shorebirds	Most recent scores/draft of the US Shorebird Conservation Plan	High Concern	Species meeting these criteria are ranked listed nationally as endangered or threatened and/or have known population declines and either low populations or one other threat or high risk factor.
		Highly Imperiled	
	Most recent scores/draft of the North Atlantic Shorebird Conservation Plan	High Concern	Species meeting these criteria have known population declines and either low populations or one other threat or high risk factor.
		Highly Imperiled	
Waterbirds	North American Waterbird Conservation Plan (2001)	Moderate Concern	Species meeting these criteria have, at the very least, declining populations and moderate threats or distributions, or stable populations with known threats or restricted distributions.
		High Concern	
		Highly Imperiled	

(Table 3 continued)

Species suite	Source	Rank	Justification
Waterbirds	BCR 28* Waterbird Conservation Plan (2005)	Moderate Concern	Species meeting these criteria have, at the very least, declining populations and moderate threats or distributions, or stable populations with known threats or restricted distributions.
		High Concern	
		Highly Imperiled	
	Southeast BCR 28 and 29* Waterbird Conservation Plan (2006)	Tier I species	Using Partners in Flight scoring criteria, this list includes all species meeting both continental and regional concern criteria, regional concern criteria only, or continental concern only.
Waterfowl	North American Waterfowl Management Plan (2004)	Moderate High	Species meeting these criteria have decreasing or unknown population trends (ducks) or unknown or below population size objectives (geese and swans). Those species ranked in these categories because of other reasons (harvest importance or negative impacts on other species) were removed so that only species of greatest conservation need are reflected.
		High	
		Highest	
	Atlantic Coast Joint Venture waterfowl Implementation Plan (2005)	Moderate High	Species meeting these criteria have decreasing or unknown population trends (ducks) or unknown or below population size objectives (geese and swans). Species ranked in these categories because of other reasons (harvest importance or negative impacts on other species) were removed from the list.
		High	
		Highest	

* More information about Bird Conservation Regions can be found at http://nabci-us.org/resources/bird-conservation-regions/

Table 4. Additional species information that was used to develop criteria for the selection of SGCN reptiles and amphibians.

Species suite	Source	Rank	Justification
Terrestrial and freshwater reptiles and amphibians	Northeast Amphibian and Reptile Species of Regional responsibility and Conservation Concern (ranked within both categories of Regional Responsibility [Northeast comprises <50% of US distribution and Northeast comprises >50% of US/Canada Distribution (includes 'close')]	Moderate Concern	Species meeting these criteria have been ranked based on an assessment of the frequency with which the species were identified within the Northeastern States' Wildlife Action Plans as "Species of Greatest Conservation Need" and the percentage of the species' range within the Northeast. However, Species of Moderate Concern and more severe were included regardless of the percentage of the species' ranges within the northeast region, i.e., <50% or >50% in order to capture several species at the limits of their range that occur in unique ecosystems.
		High Concern	
		Severe Concern	
	Turtles in Trouble: The World's 25+ Most Endangered Tortoises and Freshwater Turtles – 2011	Any species of freshwater turtle that occurs in New Jersey that is identified on this list	This list is a result of a compilation and review of multiple sources including the previous Top 25 lists from Turtle Conservation Fund (TCF, 2003) and Tortoise and Freshwater Turtle Specialist Group (TFTSG, 2007), a synthesis of all the 2007 regional lists, review and recommendations based on extinction risk by/from the membership of the TFTSG, a final review by the 30-member Steering Committee of the TFTSG, and a discussion to finalize the list at a joint leadership meeting of the principals of the Turtle Conservation Coalition.
Terrestrial and freshwater reptiles and amphibians	Vulnerability of At-risk Species to Climate Change in New York	Species considered Moderately Vulnerable	Species meeting these criteria have been ranked based on the document, *Vulnerability of At-risk Species to Climate Change in NY*, which relies heavily on NatureServe's Climate Change Vulnerability Index (CCVI) tool. The Moderately Vulnerable species designation was used as our lowest selection criteria as NatureServe identifies many reptiles and amphibians as species whose abundance or range is likely to decrease by 2050. In this timeframe, threats such as emerging diseases are also expected to increase the vulnerability of this group. The document identifies the limitations to the CCVI, which does not assign value to a number of other primary and secondary threats to wildlife.
		Species considered Highly Vulnerable	
		Species considered Extremely Vulnerable	

(Table 4 continued)

Species suite	Source	Rank	Justification
Marine reptiles	NOAA Fisheries	Candidate species for NJ waters	NOAA and FWS share jurisdiction over marine turtles, with NOAA having authority when turtles are in the water. Candidate Species are those petitioned species that are actively being considered for listing as E or T, as well as those for which NMFS has initiated an ESA status review. Proposed species are those candidate species that were found to warrant listing as either T or E and were proposed as such in the Federal Register after completion of a status reviews. Species of Concern are those about which NOAA's NMFS has some concern regarding status and threat, but for which insufficient information is available under the ESA.
		Proposed species for NJ waters	
		Species of Concern for NJ waters	

Table 5. Additional species information that was used to develop criteria for the selection of SGCN fish.

Species suite	Source	Rank	Justification
Freshwater	American Fisheries Society publication, "Conservation Status of Imperiled North American Freshwater and Diadromous Fishes" and associated rankings, dated August 2008	Endangered for NJ waters	The AFS-Endangered Species Committee used existing lists to develop a draft of the present list. AFSESC then added taxa meriting consideration and provided rationale for inclusion. Each taxon was assigned current status, listing criteria, and native ecoregion distribution. Endangered species includes taxon that is in imminent danger of extinction throughout all or extirpation from a significant portion of its range. Threatened species includes taxon that is in imminent danger of becoming endangered throughout all or a significant portion of its range. Vulnerable species includes taxon that is in imminent danger of becoming threatened throughout its range (Jelks et al. 2008).
		Threatened for NJ waters	
		Vulnerable for NJ waters	
	US Fish and Wildlife Service	Species petitioned to be listed	USFWS is the federal authority for status designation and listing of freshwater fishes. Species petitioned to be listed under the ESA undergo a 90-day process to determine whether there is enough evidence to move forward with a status review.

(Table 5 continued)

Species suite	Source	Rank	Justification
Marine	American Fisheries Society publication, "Marine, Estuarine, and Diadromous Fish Stocks at Risk of Extinction in North America (Exclusive of Pacific Salmonids)", dated November 2000	Endangered for NJ waters	AFS recognizes the following categories of risk per Musick et al. (2011): *endangered*, high risk of extinction in the wild in the immediate future (years); *threatened*, not *endangered* but facing risk of extinction in the near future (decades); *vulnerable*, not e*ndangered* or *threatened* severely but at possible risk of falling into one of these categories in the near future.
		Threatened for NJ waters	
		Vulnerable for NJ waters	
	NOAA Fisheries	Candidate species for NJ waters	NOAA Fisheries/ is the federal authority for determining status and listing of marine fishes. Candidate Species are those petitioned species that are actively being considered for listing as E or T, as well as those species for which NMFS has initiated an ESA status review. Proposed species are those candidate species that were found to warrant listing as either T or E and were officially proposed as such in the Federal Register after completion of a status review. Species of Concern are those about which NOAA's NMFS has some concern regarding status and threat, but for which insufficient information is available under the ESA.
		Proposed species for NJ waters	
		Species of Concern for NJ waters	
Marine	NOAA Fisheries	Atlantic Highly Migratory Species (HMS)	NOAA Fisheries manages a number of fish species in U.S. Atlantic and Gulf of Mexico waters known as highly migratory species (HMS). These fish—tuna, sharks, swordfish, and billfish—often migrate long distances, crossing domestic and international boundaries. NOAA Fisheries is responsible for managing HMS under the Magnuson-Stevens Fishery Conservation and Management Act. In cooperation with an advisory panel, NOAA's HMS Management Division develops and implements fishery management plans for these species taking into account all domestic and international requirements under the Atlantic Tunas Convention Act, Marine Mammal Protection Act, the Endangered Species Act, and the Migratory Bird Treaty Act.
	Atlantic States Marine Fisheries Commission	Commercially/Recreationally Important Species	The Atlantic States Marine Fisheries Commission, together with state fisheries managers, develops fisheries management plans (FMPs) for species of value to the commercial and recreational fishing industries. FMPs regulate fishing practices through measures designed to ensure sustainable fish populations well into the future.

Table 6. Additional species information that was used to develop criteria for the selection of SGCN macroinvertebrates.

Species suite	Source	Rank	Justification
Bees/Ants (Hymenoptera)	Xerces Society Red List	PE (possibly extinct)	The list was created by a panel of experts in the field of invertebrate conservation and coordinated by the Xerces Society and the American Museum of Natural History. The list was created with data from NatureServe and various museum and research collections and papers. Members of the panel ranked species based on the level of threats facing them or amount of population decline they have suffered. Species deemed to be of conservation concern but lacking sufficient data for a ranking were listed as DD (data deficient and in need of further research).
		CI (critically imperiled)	
		I (Imperiled)	
		V (vulnerable)	
		DD (Data deficient)	
Butterflies/ Lepidoptera	Schweitzer, D. F., M. C. Minno, and D. L. Wagner. 2011. Rare, Declining, and Poorly Known Butterflies and Moths (Lepidoptera) of Forests and Woodlands in the Eastern United States. U.S. Forest Service, Forest Health Technology Enterprise Team, FHTET-2011-01.	All species included in the report and documented in NJ.	This publication was a report created by a panel of Lepidoptera experts. It analyzed all available regional Lepidoptera data from NatureServe, State databases, and Lepidoptera research projects in order to generate a list and report on the species of greatest conservation need.
	Xerces Society Red List	PE (possibly extinct)	The list was created by a panel of experts in the field of invertebrate conservation and coordinated by the Xerces Society and the American Museum of Natural History. The list was created with data from NatureServe and various museum and research collections and papers. Members of the panel ranked species based on the level of threats facing them or amount of population decline they have suffered. Species deemed to be of conservation concern but lacking sufficient data for a ranking were listed as DD (data deficient and in need of further research).
		CI (critically imperiled)	
		I (Imperiled)	
		V (vulnerable)	
		DD (Data deficient)	
Coleoptera	Xerces Society Red List	PE (possibly extinct)	The list was created by a panel of experts in the field of invertebrate conservation and coordinated by the Xerces Society and the American Museum of Natural History. The list was created with data from NatureServe and various museum and research collections and papers. Members of the panel ranked species based on the level of threats facing them or amount of population decline they have suffered. Species deemed to be of conservation concern but lacking sufficient data for a ranking were listed as DD (data deficient and in need of further research).
		CI (critically imperiled)	
		I (Imperiled)	
		V (vulnerable)	
		DD (Data deficient)	

(Table 6 continued)

Species suite	Source	Rank	Justification
Crayfish	American Fisheries Society publication, "Conservation Status of Crayfish Species" and associated rankings, dated August 2007	Endangered	The AFS-Endangered Species Committee lists crayfish based on a comprehensive review of US/Canadian status. Definitions are as follows: Endangered (E) species are those species or subspecies in danger of extinction throughout all or significant portion of range. Threatened (T) species are those species or subspecies likely to become endangered throughout all or a significant portion of the range. Vulnerable species include species or subspecies that may become E or T by minor disturbances to its habitat and deserves careful monitoring of abundance and distribution.
		Threatened	
		Vulnerable	
Dragonflies and Damselflies/Odonata	Xerces Society Red List	PE (possibly extinct)	The list was created by a panel of experts in the field of invertebrate conservation and coordinated by the Xerces Society and the American Museum of Natural History. The list was created with data from NatureServe and various museum and research collections and papers. Members of the panel ranked species based on the level of threats facing them or amount of decline they have suffered. Species deemed to be of conservation concern but lacking sufficient data for a ranking were listed as DD (data deficient and in need of further research).
		CI (critically imperiled)	
		I (Imperiled)	
		V (vulnerable)	
		DD (Data deficient)	
	Northeastern Regional Odonata Status Assessment	All species found to be of regional conservation concern.	This list is being generated by a panel of experts from the Northeastern United States. Data from NatureServe and individual State databases will be analyzed to generate a list of species of regional conservation concern based on threats and population decline.
Freshwater Mussels	US Fish and Wildlife Service	Species petitioned to be listed	FWS is federal authority for status determination and listing of freshwater mussels; species petitioned to be listed under the ESA undergo a 90-day process to determine whether there is enough evidence to move forward with a status review.
Other Mollusks & Crustaceans (fairy shrimp, clam-shrimp)	US Fish and Wildlife Service	Species petitioned to be listed	FWS is federal authority for status determination and listing of freshwater invertebrates. Species petitioned to be listed under the ESA undergo a 90-day process to determine whether there is enough evidence to move forward with a status review.

Table 7. Criteria that dictate if wildlife species are in need of further investigation. They are considered SGCN based on the DFW assessment as being "data deficient."

Species suite	Source	Rank	Justification
All taxonomic groups	NJ Division of Fish and Wildlife	State Status of Undetermined/Unknown per Delphi process	New Jersey has adapted and implements the Delphi Status Review (or Delphi Technique) to determine the relative endangerment or stability of a species' population. A systematic method for reaching consensus among experts, the Delphi process is an iterative process characterized by anonymity among the participating experts and controlled feedback via the principal investigator. The results of this status assessment are used to assign the legal status of species in the state. *Unknown (U)* species are those for which it is impossible to assign E, T, or SC because enough information on which to base a judgment simply does not exist.

References/Citations

FWS. 2011. Candidate Species: Section 4 of the Endangered Species Act. Candidate Species Fact Sheet, March 2011. http://www.fws.gov/endangered/esa-library/pdf/candidate_species.pdf

Jelks, H.L. S.J. Walsh. N.M. Burkhead. S. Contreras-Balderas, E. Díaz-Pardo, D.A. Hendrickson, J. Lyons, N.E. Mandrak, F. McCormick, J.S. Nelson, S.P. Platania, B.A. Porter, C.B. Renaud, J.J. Schmitter-Soto, E.B. Taylor, and M.L. Warren, Jr. 2008. Conservation Status of Imperiled North American Freshwater and Diadromous Fishes. Fisheries 33(8):372-407.

Musick, J.A., M.M. Harbin, S.A. Berkeley, G.H. Burgess, A.M. Eklund, L. Findley, R.G. Gilmore, J.T. Golden, D.S. Ha, G.R. Huntsman, J.C. McGovern, G.R. Sedberry, S.J. Parker, S.G. Poss, E. Sala, T.W. Schmidt, H. Weeks, and S.G. Wright. 2011. Marine, Estuarine, and Diadromous Fish Stocks at Risk of Extinction in North America (Exclusive of Pacific Salmonids). Fisheries 25(11):6-30.

National Oceanographic and Atmospheric Administration, National Marine Fisheries Service, Habitat Conservation website, http://www.habitat.noaa.gov/protection/efh/index.html, Accessed 5 January 2015.

Schlesinger, M.D., J.D. Corser, K.A. Perkins, and E.L. White. 2011. Vulnerability of At-risk Species to Climate Change in New York. New York Natural Heritage Program, Albany, NY. 67 pp.

Appendix B: New Jersey's Species of Greatest Conservation Need and the Selection Criteria Each Fulfilled

New Jersey's Species of Greatest Conservation Need and the Selection Criteria Each Fulfilled

The following table lists New Jersey's 656 Species of Greatest Conservation Need (SGCN), as updated for the State Wildlife Action Plan. All of the state's indigenous wildlife species were evaluated using the best available assessments of conservation status and trends. Each species met at least one of the chosen assessment criteria described in Appendix A, *Criteria for Selecting Species of Greatest Conservation Need* , in order to be included on the SGCN list. The criteria category (or categories) met by each SGCN are indicated below. Species that further advanced to Priority SGCN or Focal Species status are indicated in the far right columns.

Common Name	Scientific Name	USFWS List	State List	NatureServe Global Rank	NatureServe State Rank	IUCN Red List	Regional SGCN List	Taxa Specific Criteria	Data Deficient	Priority SGCN	Focal Species
Mammals											
Marine Mammals											
Bottlenose Dolphin	*Tursiops truncatus*										
Fin Whale	*Balaenoptera physalus*	X	X	X	X	X	X	X		X	
Gray Seal	*Halichoerus grypus*				X						
Harbor Porpoise	*Phocoena phocoena*		X				X			X	
Hooded Seal	*Cystophora cristata*					X					
Humpback Whale	*Megaptera novaeangliae*	X	X		X		X	X		X	
North Atlantic Right Whale	*Eubalaena glacialis*	X	X	X	X	X	X	X		X	X
Short-beaked Common Dolphin	*Delphinus delphis*								X		
Short-finned Pilot Whale	*Globicephala*								X		
Striped Dolphin	*Stenella coeruleoalba*								X		
Terrestrial Mammals											
Allegheny Woodrat	*Neotoma magister*		X	X	X	X	X	X		X	X
American Pygmy Shrew	*Sorex hoyi*								X		
Big Brown Bat	*Eptesicus fuscus*		X				X			X	
Bobcat	*Lynx rufus*		X				X	X		X	
Eastern Small-footed Myotis	*Myotis leibii*		X	X	X		X	X		X	
Fisher	*Martes pennanti*							X			
Hairy-tailed Mole	*Parascalops breweri*						X			X	
Hoary Bat	*Lasiurus cinereus*		X				X	X		X	
Indiana Bat	*Myotis sodalis*	X	X	X	X	X	X	X		X	X
Least Shrew	*Cryptotis parva*						X	X		X	
Little Brown Bat	*Myotis lucifugus*		X	X	X		X	X		X	X
Long-tailed Shrew	*Sorex dispar*						X	X		X	
Marsh Rice Rat	*Oryzomys palustris*							X			
Meadow Jumping Mouse	*Zapus hudsonius*		X								
Northern Flying Squirrel	*Glaucomys sabrinus*							X			
Northern Myotis	*Myotis septentrionalis*	X	X	X	X		X	X		X	X
Red Bat	*Lasiurus borealis*		X				X	X		X	

(SGCN & the selection criteria fulfilled continued)

Common Name	Scientific Name	USFWS List	State List	NatureServe Global Rank	NatureServe State Rank	IUCN Red List	Regional SGCN List	Taxa Specific Criteria	Data Deficient	Priority SGCN	Focal Species
Silver-haired Bat	*Lasionycteris noctivagans*		X				X	X		X	
Smokey Shrew	*Sorex fumeus*						X	X		X	
Southern Bog Lemming	*Synaptomys cooperi*						X	X		X	
Star-nosed Mole	*Condylura cristata*						X			X	
Tricolored Bat	*Perimyotis subflavus*		X	X			X			X	
Tuckahoe Masked Shrew	*Sorex cinereus nigriculus*				X					X	
Water Shrew	*Sorex palustris*								X		
Woodland Jumping Mouse	*Napaeozapus insignis*						X			X	
Birds											
Acadian Flycatcher	*Empidonax virescens*						X	X		X	
American Bittern	*Botaurus lentiginosus*		X				X	X		X	
American Black Duck	*Anas rubripes*						X	X		X	
American Coot	*Fulica americana*							X			
American Golden Plover	*Pluvialis dominica*							X			
American Kestrel	*Falco sparverius*		X				X	X		X	
American Oystercatcher	*Haematopus palliatus*		X				X	X		X	X
American Woodcock	*Scolopax minor*						X	X		X	X
Atlantic Brant	*Branta bernicla hrota*							X		X	
Audubon's Shearwater	*Puffinus iherminieri*							X			
Bald Eagle	*Haliaeetus leucocephalus*		X					X		X	
Baltimore Oriole	*Icterus galbula*							X			
Bank Swallow	*Riparia riparia*						X			X	
Barn Owl	*Tyto alba*		X				X			X	
Barred Owl	*Strix varia*		X							X	
Bay-breasted Warbler	*Dendroica castanea*						X	X		X	
Belted Kingfisher	*Megaceryle alcyon*							X			
Bicknell's Thrush	*Catharus bicknelli*					X	X	X		X	
Black Rail	*Laterallus jamaicensis*		X	X	X	X	X	X		X	X
Black Scoter	*Melanitta nigra*					X		X			
Black Skimmer	*Rynchops niger*		X				X	X		X	X
Black Tern	*Chlidonias niger*						X	X		X	
Black-and-white Warbler	*Mniotilta varia*						X	X		X	
Black-bellied Plover	*Pluvialis squatarola*							X			
Black-billed Cuckoo	*Coccyzus erythropthalmus*		X				X	X		X	
Blackburnian Warbler	*Dendroica fusca*		X				X	X		X	
Black-crowned Night-heron	*Nycticorax nycticorax*		X				X	X		X	
Black-throated Blue Warbler	*Dendroica caerulescens*		X				X			X	

(SGCN & the selection criteria fulfilled continued)

Common Name	Scientific Name	USFWS List	State List	NatureServe Global Rank	NatureServe State Rank	IUCN Red List	Regional SGCN List	Taxa Specific Criteria	Data Deficient	Priority SGCN	Focal Species
Black-throated Green Warbler	*Dendroica virens*		X				X	X		X	
Blue-headed (Solitary) Vireo	*Vireo solitarius*		X								
Blue-winged Warbler	*Vermivora pinus*						X	X		X	X
Bobolink	*Dolichonyx oryzivorus*		X				X			X	X
Bridled tern	*Onychoprion anaethetus*				X			X			
Broad-winged Hawk	*Buteo platypterus*		X				X			X	
Brown Thrasher	*Toxostoma rufum*		X				X	X		X	
Bufflehead	*Bucephala albeola*							X			
Canada Goose	*Branta canadensis*							X			
Canada Warbler	*Wilsonia canadensis*		X				X	X		X	
Canvasback	*Aythya valisineria*							X			
Cape May Warbler	*Dendroica tigrina*						X			X	
Caspian Tern	*Hydroprogne caspia*		X								
Cattle Egret	*Bubulcus ibis*		X				X			X	
Cerulean Warbler	*Dendroica cerulea*		X			X	X	X		X	X
Chimney Swift	*Chaetura pelagica*					X	X	X		X	
Chuck-will's-widow	*Caprimulgus carolinensis*						X	X		X	
Clapper Rail	*Rallus longirostris*						X	X		X	
Cliff Swallow	*Petrochelidon pyrrhonota*		X								
Common Eider	*Somateria mollissima*						X	X		X	
Common Gallinule	*Gallinula galeata*		X					X			
Common Loon	*Gavia immer*						X	X		X	
Common Nighthawk	*Chordeiles minor*		X				X			X	
Common Tern	*Sterna hirundo*		X				X	X		X	X
Cooper's Hawk	*Accipiter cooperii*		X								
Dickcissel	*Spiza americana*						X	X		X	
Dunlin	*Calidris alpina*							X			
Eastern Kingbird	*Tyrannus tyrannus*							X			
Eastern Meadowlark	*Sturnella magna*		X				X	X		X	X
Eastern Towhee	*Pipilo erythrophthalmus*						X	X		X	
Eastern Wood-pewee	*Contopus virens*							X			
Field Sparrow	*Spizella pusilla*						X	X		X	
Forster's Tern	*Sterna forsteri*						X	X		X	X
Glossy Ibis	*Plegadis falcinellus*		X					X			
Golden Eagle	*Aquila chrysaetos*						X			X	
Golden-winged Warbler	*Vermivora chrysoptera*		X			X	X	X		X	X
Grasshopper Sparrow	*Ammodramus savannarum*		X				X	X		X	X

(SGCN & the selection criteria fulfilled continued)

Common Name	Scientific Name	USFWS List	State List	NatureServe Global Rank	NatureServe State Rank	IUCN Red List	Regional SGCN List	Taxa Specific Criteria	Data Deficient	Priority SGCN	Focal Species
Gray Catbird	*Dumetella carolinensis*							X			
Gray-cheeked Thrush	*Catharus minimus*		X								
Great Blue Heron	*Ardea herodias*		X								
Great Crested Flycatcher	*Myiarchus crinitus*							X			
Greater Scaup	*Aythya marila*							X			
Greater Shearwater	*Puffinus gravis*							X			
Greater Yellowlegs	*Tringa melanoleuca*							X			
Gull-billed Tern	*Gelochelidon nilotica*		X				X	X		X	
Henslow's Sparrow	*Ammodramus henslowii*		X		X	X	X	X		X	
Hooded Merganser	*Lophodytes cucullatus*		X					X			
Hooded Warbler	*Wilsonia citrina*		X				X	X		X	
Horned Grebe	*Podiceps auritus*							X			
Horned Lark	*Eremophila alpestris*		X				X			X	
Hudsonian Godwit	*Limosa haemastica*				X			X			
Kentucky Warbler	*Oporornis formosus*		X				X	X		X	X
Killdeer	*Charadrius vociferus*							X			
King Rail	*Rallus elegans*		X				X	X		X	
Least Bittern	*Ixobrychus exilis*		X				X	X		X	
Least Flycatcher	*Empidonax minimus*		X								
Least Sandpiper	*Calidris minutilla*							X			
Least Tern	*Sternula antillarum*		X				X	X		X	X
Lesser Scaup	*Aythya affinis*							X			
Lesser Yellowlegs	*Tringa flavipes*							X			
Little Blue Heron	*Egretta caerulea*		X				X	X		X	X
Loggerhead Shrike	*Lanius ludovicianus migrans*		X		X		X	X		X	
Long-eared Owl	*Asio otus*		X				X	X		X	
Long-tailed Duck	*Clangula hyemalis*					X		X			
Louisiana Waterthrush	*Seiurus motacilla*						X	X		X	
Manx Shearwater	*Puffinus puffinus*				X			X			
Marbled Godwit	*Limosa fedoa*						X	X		X	
Marsh Wren	*Cistothorus palustris*						X	X		X	
Nashville Warbler	*Oreothlypis ruficapilla*		X								
Nelson's Sharp-tailed Sparrow	*Ammodramus nelsoni*				X			X			
Northern Bobwhite	*Colinus virginianus*					X	X	X		X	X
Northern Flicker	*Colaptes auratus*							X			
Northern Gannet	*Morus bassanus*							X			
Northern Goshawk	*Accipiter gentilis*		X				X			X	

(SGCN & the selection criteria fulfilled continued)

Common Name	Scientific Name	USFWS List	State List	NatureServe Global Rank	NatureServe State Rank	IUCN Red List	Regional SGCN List	Taxa Specific Criteria	Data Deficient	Priority SGCN	Focal Species
Northern Harrier	*Circus cyaneus*		X				X	X		X	X
Northern Parula	*Parula americana*		X				X			X	
Northern Pintail	*Anas acuta*							X		X	
Northern Saw-Whet Owl	*Aegolius acadicus*							X			
Olive-sided Flycatcher	*Contopus cooperi*					X	X	X		X	
Osprey	*Pandion haliaetus*		X							X	
Peregrine Falcon	*Falco peregrinus*		X				X	X		X	X
Pied-billed Grebe	*Podilymbus podiceps*		X				X	X		X	X
Piping Plover	*Charadrius melodus*	X	X	X	X	X	X	X		X	X
Prairie Warbler	*Dendroica discolor*						X	X		X	
Prothonotary Warbler	*Protonotaria citrea*						X	X		X	X
Purple Finch	*Carpodacus purpureus*							X			
Purple Martin	*Progne subis*							X			
Purple Sandpiper	*Calidris maritima*						X	X		X	
Razorbill	*Alca torda*				X			X			
Red Knot	*Calidris canutus*	X	X		X		X	X		X	X
Red-headed Woodpecker	*Melanerpes erythrocephalus*		X			X	X	X		X	X
Red-shouldered Hawk	*Buteo lineatus*		X				X			X	
Red-throated Loon	*Gavia stellata*							X			
Roseate Tern	*Sterna dougallii dougalli*	X	X		X		X	X		X	
Rose-breasted Grosbeak	*Pheucticus ludovicianus*							X			
Royal Tern	*Sterna maxima*							X			
Ruddy Duck	*Oxyura jamaicensis*							X			
Ruddy Turnstone	*Arenaria interpres*						X	X		X	X
Ruffed Grouse	*Bonasa umbellus*						X	X		X	
Rusty Blackbird	*Euphagus carolinus*					X	X	X		X	
Saltmarsh Sparrow	*Ammodramus caudacutus*		X			X	X	X		X	
Sanderling	*Calidris alba*		X				X	X		X	
Savannah Sparrow	*Passerculus sandwichensis*		X							X	
Scarlet Tanager	*Piranga olivacea*						X	X		X	X
Seaside Sparrow	*Ammodramus maritimus*						X	X		X	
Sedge Wren	*Cistothorus platensis*		X				X	X		X	
Semipalmated Sandpiper	*Calidris pusilla*		X			X	X			X	
Sharp-shinned Hawk	*Accipiter striatus*		X								
Short-billed Dowitcher	*Limnodromus griseus*							X			
Short-eared Owl	*Asio flammeus*		X				X	X		X	
Snowy Egret	*Egretta thula*		X				X	X		X	X

(SGCN & the selection criteria fulfilled continued)

Common Name	Scientific Name	USFWS List	State List	NatureServe Global Rank	NatureServe State Rank	IUCN Red List	Regional SGCN List	Taxa Specific Criteria	Data Deficient	Priority SGCN	Focal Species
Solitary Sandpiper	*Tringa solitaria*							X			
Sora	*Porzana carolina*		X				X			X	
Spotted Sandpiper	*Actitis macularius*		X								
Summer Tanager	*Piranga rubra*						X	X		X	
Surf Scoter	*Melanitta perspicillata*							X			
Swainson's Warbler	*Limnothlypis swainsonii*						X	X		X	
Tricolored Heron	*Egretta tricolor*		X				X	X		X	X
Upland Sandpiper	*Bartramia longicauda*		X				X	X		X	
Veery	*Catharus fuscescens*		X				X	X		X	
Vesper Sparrow	*Pooecetes gramineus*		X				X			X	X
Virginia Rail	*Rallus limicola*		X								
Whimbrel	*Numenius phaeopus*		X				X	X		X	
Whip-poor-will	*Caprimulgus vociferus*		X					X			
White-rumped Sandpiper	*Calidris fuscicollis*				X			X			
White-throated Sparrow	*Zonotrichia albicollis*							X			
White-winged Scoter	*Melanitta fusca*							X			
Willet	*Tringa semipalmata*						X	X		X	
Willow Flycatcher	*Empidonax traillii*						X	X		X	
Wilson's Phalarope	*Phalaropus tricolor*						X	X		X	
Winter Wren	*Troglodytes hiemalis*		X								
Wood Duck	*Aix sponsa*							X			
Wood Thrush	*Hylocichla mustelina*		X				X	X		X	X
Worm-eating Warbler	*Helmitheros vermivorum*		X				X	X		X	
Yellow-bellied Flycatcher	*Empidonax flaviventris*							X			
Yellow-billed Cuckoo	*Coccyzus americanus*							X			
Yellow-breasted Chat	*Icteria virens*		X				X	X		X	
Yellow-crowned Night-heron	*Nyctanassa violacea*		X				X	X		X	
Yellow-throated Vireo	*Vireo flavifrons*						X	X		X	
Reptiles & Amphibians											
Amphibians											
Allegheny Dusky Salamander	*Desmognathus ochrophaeus*						X			X	
Atlantic Coast Leopard Frog[1]	*Lithobates kauffeldi*								X		
Blue-spotted Salamander	*Ambystoma laterale*		X				X	X		X	
Carpenter Frog	*Lithobates virgatipes*		X				X	X		X	X
Cope's Gray Treefrog	*Hyla chrysoscelis*		X					X		X	
Eastern Mud Salamander	*Pseudotriton montanus*		X				X	X		X	
Eastern Spadefoot	*Scaphiopus holbrookii*						X	X		X	X

(SGCN & the selection criteria fulfilled continued)

Common Name	Scientific Name	USFWS List	State List	NatureServe Global Rank	NatureServe State Rank	IUCN Red List	Regional SGCN List	Taxa Specific Criteria	Data Deficient	Priority SGCN	Focal Species
Eastern Tiger Salamander	*Ambystoma tigrinum*		X					X		X	X
Four-toed Salamander	*Hemidactylium scutatum*							X			
Fowler's Toad	*Anaxyrus fowleri*						X	X		X	
Green Treefrog[1]	*Hyla cinerea*								X		
Jefferson Salamander	*Ambystoma jeffersonianum*		X				X	X		X	
Longtail Salamander	*Eurycea longicauda*		X				X	X		X	X
Marbled Salamander	*Ambystoma opacum*		X				X	X		X	
New Jersey Chorus Frog	*Pseudacris kalmi*						X	X		X	X
Northern Cricket Frog	*Acris crepitans crepitans*						X	X	X	X	
Northern Dusky Salamander	*Desmognathus fuscus*						X			X	
Northern Red Salamander	*Pseudotriton ruber ruber*						X	X		X	X
Northern Spring Salamander	*Gyrinophilus porphyriticus porphyriticus*		X				X	X		X	
Northern Two-lined Salamander	*Eurycea bislineata*						X			X	
Pine Barrens Treefrog	*Hyla andersonii*		X			X				X	X
Slimy Salamander	*Plethodon glutinosus*						X			X	
Southern Leopard Frog	*Lithobates sphenocephala*							X	X		
Spotted Salamander	*Ambystoma maculatum*							X			
Reptiles											
Atlantic Green Turtle	*Chelonia mydas*	X	X	X	X	X	X	X		X	X
Atlantic Hawksbill	*Eretmochelys imbricata*	X	X	X	X	X	X	X		X	
Atlantic Leatherback	*Dermochelys coriacea*	X	X	X	X	X	X	X		X	X
Atlantic Loggerhead	*Caretta caretta*	X	X	X	X	X	X	X		X	X
Atlantic Ridley	*Lepidochelys kempii*	X	X	X	X	X	X	X		X	X
Bog Turtle	*Glyptemys muhlenbergii*	X	X	X	X	X	X	X		X	X
Corn Snake	*Elaphe guttata guttata*		X				X	X		X	X
Eastern Box Turtle	*Terrapene carolina carolina*		X				X	X		X	X
Eastern Fence Lizard	*Sceloporus undulatus*							X			
Eastern Hognose Snake	*Heterodon platirhinos*						X	X		X	X
Eastern Kingsnake	*Lampropeltis getula getula*		X					X			
Eastern Mud Turtle	*Kinosternon subrubrum*							X			
Eastern Painted Turtle	*Chrysemys picta picta*							X			
Eastern Ratsnake	*Elaphe obsoleta*							X			
Eastern Redbelly Turtle	*Pseudemys rubriventris*					X	X			X	X
Eastern Ribbon Snake	*Thamnophis sauritus*						X	X		X	
Eastern Smooth Earth Snake	*Virginia valeriae valeriae*							X			

(SGCN & the selection criteria fulfilled continued)

Common Name	Scientific Name	USFWS List	State List	NatureServe Global Rank	NatureServe State Rank	IUCN Red List	Regional SGCN List	Taxa Specific Criteria	Data Deficient	Priority SGCN	Focal Species
Eastern Worm Snake	*Carphophis amoenus*							X			
Five-lined Skink	*Eumeces fasciatus*							X			
Ground Skink	*Scincella lateralis*							X	X		
Northern Black Racer	*Coluber constrictor*						X	X		X	X
Northern Brown Snake	*Storeria dekayi dekayi*						X			X	
Northern Copperhead Snake	*Agkistrodon contortrix*		X				X	X		X	
Northern Diamondback Terrapin	*Malaclemys terrapin terrapin*						X			X	X
Northern Pine Snake	*Pituophis melanoleucus melanoleucus*		X							X	X
Northern Ringneck Snake	*Diadophis punctatus edwardsii*						X			X	
Northern Scarlet Snake	*Cemophora coccinea copei*						X	X		X	X
Queen Snake	*Regina septemvittata*		X				X	X		X	
Rough Green Snake	*Opheodrys aestivus*						X	X		X	
Smooth Green Snake	*Liochlorophis vernalis*						X	X		X	
Spotted Turtle	*Clemmys guttata*		X			X	X	X		X	
Timber Rattlesnake	*Crotalus horridus horridus*		X				X	X		X	X
Wood Turtle	*Glyptemys insculpta*		X			X	X	X		X	X
Fish											
Freshwater Fish											
American Brook Lamprey	*Lethenteron appendix*		X				X	X		X	
Banded Sunfish	*Enneacanthus obesus*						X	X		X	X
Blackbanded Sunfish	*Enneacanthus chaetodon*						X	X		X	X
Bluespotted Sunfish	*Enneacanthus gloriosus*							X		X	
Bridle Shiner	*Notropis bifrenatus*		X	X	X	X	X	X		X	X
Brook Trout	*Salvelinus fontinalis*		X				X	X		X	X
Comely Shiner	*Notropis amoenus*		X				X	X		X	X
Cutlips Minnow	*Exoglossum maxillingua*						X	X		X	
Eastern Mudminnow	*Umbra pygmaea*						X	X		X	
Fallfish	*Semotilus corporalis*						X			X	
Ironcolor Shiner	*Notropis chalybaeus*		X				X	X		X	X
Margined Madtom	*Noturus insignis*						X	X		X	
Mud Sunfish	*Acantharchus pomotis*		X				X	X		X	X
Northern Hog Sucker	*Hypentelium nigricans*		X							X	
Pirate Perch	*Aphredoderus sayanus*							X			
Redbreast Sunfish	*Lepomis auritus*						X	X		X	
Satinfin Shiner	*Cyprinella analostana*						X	X		X	

(SGCN & the selection criteria fulfilled continued)

Common Name	Scientific Name	USFWS List	State List	NatureServe Global Rank	NatureServe State Rank	IUCN Red List	Regional SGCN List	Taxa Specific Criteria	Data Deficient	Priority SGCN	Focal Species
Shield Darter	*Percina peltata*		X				X	X		X	
Slimy Sculpin	*Cottus cognatus*		X				X	X		X	
Spotfin Shiner	*Cyprinella spiloptera*							X			
Swallowtail Shiner	*Notropis procne*						X			X	
Swamp Darter	*Etheostoma fusiforme*						X	X		X	X
Tadpole Madtom	*Noturus gyrinus*							X		X	
White Catfish	*Ameiurus catus*							X			
Yellow Bullhead	*Ameiurus natalis*							X			
Marine Fish											
Alewife	*Alosa pseudoharengus*						X	X		X	X
American Eel	*Anguilla rostrata*						X	X		X	
American Sand Lance	*Ammodytes americanus*						X			X	
American Shad	*Alosa sapidissima*						X			X	
Atlantic Angel Shark	*Squatina dumeril*						X	X	X	X	
Atlantic Cod	*Gadus morhua*					X		X			
Atlantic Herring	*Clupea harengus*						X	X		X	
Atlantic Mackerel	*Scomber scombrus*						X	X		X	
Atlantic Menhaden	*Brevoortia tyrannus*							X			
Atlantic Silverside	*Menidia menidia*						X			X	
Atlantic Sturgeon	*Acipenser oxyrinchus*	X	X	X	X	X	X	X		X	X
Atlantic Tomcod	*Microgadus tomcod*						X	X		X	
Barndoor Skate	*Dipturus laevis*			X		X	X	X		X	
Basking Shark	*Cetorhinus maximus*					X		X	X		
Bigeye Thresher Shark	*Alopias superciliosus*							X	X		
Black Drum	*Pogonias cromis*							X			
Black Sea Bass	*Centropristis striata*							X			
Blue shark	*Prionace glauca*						X	X	X	X	
Blueback Herring	*Alosa aestivalis*					X	X	X		X	X
Bluefish	*Pomatomus saltatrix*							X			
Butterfish	*Peprilus triacanthus*						X	X		X	
Common Thresher Shark	*Alopias vulpinus*						X	X	X	X	
Cunner	*Tautogolabrus adspersus*						X			X	
Dusky Shark	*Carcharhinus obscurus*			X		X		X	X		
Eastern Silvery Minnow	*Hybognathus regius*						X			X	
Fourspine Stickleback	*Apeltes quadracus*						X			X	
Fourspot Flounder	*Paralichthys oblongus*						X			X	
Goosefish	*Lophius americanus*						X	X		X	

(SGCN & the selection criteria fulfilled continued)

Common Name	Scientific Name	USFWS List	State List	NatureServe Global Rank	NatureServe State Rank	IUCN Red List	Regional SGCN List	Taxa Specific Criteria	Data Deficient	Priority SGCN	Focal Species
Hickory Shad	*Alosa mediocris*						X			X	
Little Skate	*Leucoraja erinacea*					X	X			X	
Longfin Mako Shark	*Isurus paucus*							X	X		
Longfin Squid	*Loligo pealei*							X			
Mummichog	*Fundulus heteroclitus*						X			X	
Narrowtooth Shark	*Carcharhinus brachyurus*							X	X		
Night Shark	*Carcharhinus signatus*			X		X		X	X		
Northern Puffer	*Sphoeroides maculatus*						X	X		X	
Northern Searobin	*Prionotus carolinus*						X			X	
Ocean Pout	*Zoarces americanus*						X			X	
Oyster Toadfish	*Opsanus tau*						X			X	
Porbeagle Shark	*Lamna nasus*					X	X	X	X	X	
Red Drum	*Sciaenops ocellatus*							X			
Red Hake	*Urophycis chuss*						X			X	
Roughtail Stingray	*Dasyatis centroura*						X			X	
Sand Tiger Shark	*Carcharias taurus*			X		X		X	X		
Sandbar Shark	*Carcharhinus milberti*							X	X		
Scalloped Hammerhead	*Sphyrna lewini*	X						X	X	X	
Scup	*Stenotomus chrysops*							X			
Sea Raven	*Hemitripterus americanus*						X			X	
Sharpnose Sevengill Shark	*Heptranchias perlo*							X	X		
Shortfin Mako	*Isurus oxyrinchus*					X	X	X	X	X	
Shortnose Sturgeon	*Acipenser brevirostrum*	X	X	X	X	X	X	X		X	X
Silver Hake	*Merluccius bilinearis*						X			X	
Sixgill Shark	*Hexanchus griseus*							X	X		
Smooth Dogfish	*Mustelus canis*							X	X		
Smooth Hammerhead	*Sphyrna zygaena*					X	X	X	X	X	
Spiny Dogfish	*Squalus acanthias*						X	X		X	
Spotfin Killifish	*Fundulus luciae*				X		X			X	
Striped Bass	*Morone saxatilis*							X		X	
Striped Killifish	*Fundulus majalis*						X			X	
Striped Searobin	*Prionotus evolans*						X			X	
Summer Flounder	*Paralichthys dentatus*							X			
Tautog	*Tautoga onitis*					X	X	X		X	
Thorny skate	*Amblyraja radiata*					X	X	X		X	
Weakfish	*Cynoscion regalis*							X			
Whale Shark	*Rhincodon typus*							X	X		

(SGCN & the selection criteria fulfilled continued)

Common Name	Scientific Name	USFWS List	State List	NatureServe Global Rank	NatureServe State Rank	IUCN Red List	Regional SGCN List	Taxa Specific Criteria	Data Deficient	Priority SGCN	Focal Species
Windowpane	*Scophthalmus aquosus*						X			X	
Winter Flounder	*Pseudopleuronectes americanus*						X	X		X	
Winter Skate	*Leucoraja ocellata*					X	X			X	
Invertebrates											
Arthropods											
Horseshoe Crab	*Limulus polyphemus*							X		X	
Bees											
American Bumble Bee	*Bombus pensylvanicus*			X		X		X		X	X
Ashton Cuckoo Bumble Bee	*Bombus bohemicus*					X		X		X	X
Macropis Cuckoo Bee	*Epeoloides pilosula*							X	X[2]		
Orchard Mason Bee	*Osmia lignaria*							X	X[2]		
Rusty Patched Bumble Bee	*Bombus affinis*	X	X	X		X		X		X	X
Sanderson Bumble Bee	*Bombus sandersoni*							X		X	
Southern Plains Bumble Bee	*Bombus fraternus*					X		X		X	X
Unnamed bee	*Andrena ceanothi*							X	X[2]		
Unnamed bee	*Andrena confederata*							X	X[2]		
Unnamed bee	*Andrena duplicata*							X	X[2]		
Unnamed bee	*Andrena frigida*							X	X[2]		
Unnamed bee	*Andrena fulvipennis*							X	X[2]		
Unnamed bee	*Andrena geranii*							X	X[2]		
Unnamed bee	*Andrena helianthi*							X	X[2]		
Unnamed bee	*Andrena hirticincta*							X	X[2]		
Unnamed bee	*Andrena ilicis*							X	X[2]		
Unnamed bee	*Andrena integra*							X	X[2]		
Unnamed bee	*Andrena krigiana*							X	X[2]		
Unnamed bee	*Andrena neonana*							X	X[2]		
Unnamed bee	*Andrena nivalis*							X	X[2]		
Unnamed bee	*Andrena personata*							X	X[2]		
Unnamed bee	*Andrena placata*							X	X[2]		
Unnamed bee	*Andrena platyparia*							X	X[2]		
Unnamed bee	*Andrena rudbeckiae*							X	X[2]		
Unnamed bee	*Andrena screpteropsis*							X	X[2]		
Unnamed bee	*Andrena uvulariae*							X	X[2]		
Unnamed bee	*Andrena ziziaeformis*							X	X[2]		
Unnamed bee	*Ceratina zadontomerus*							X	X[2]		
Unnamed bee	*Heriades leavitti*							X	X[2]		

(SGCN & the selection criteria fulfilled continued)

Common Name	Scientific Name	USFWS List	State List	NatureServe Global Rank	NatureServe State Rank	IUCN Red List	Regional SGCN List	Taxa Specific Criteria	Data Deficient	Priority SGCN	Focal Species
Unnamed bee	*Hoplitis spoliata*							X	X[2]		
Unnamed bee	*Lasioglossum anomalum*							X	X[2]		
Unnamed bee	*Lasioglossum apopkense*							X	X[2]		
Unnamed bee	*Lasioglossum arantium*							X	X[2]		
Unnamed bee	*Lasioglossum atwoodi*							X	X[2]		
Unnamed bee	*Lasioglossum birkmanni*							X	X[2]		
Unnamed bee	*Lasioglossum ceanothi*							X	X[2]		
Unnamed bee	*Lasioglossum cinctipes*							X	X[2]		
Unnamed bee	*Lasioglossum creberrimum*							X	X[2]		
Unnamed bee	*Lasioglossum ellisiae*							X	X[2]		
Unnamed bee	*Lasioglossum heterognathum*							X	X[2]		
Unnamed bee	*Lasioglossum katherineae*							X	X[2]		
Unnamed bee	*Lasioglossum nymphale*							X	X[2]		
Unnamed bee	*Lasioglossum paradmirandum*							X	X[2]		
Unnamed bee	*Lasioglossum pectinatum*							X	X[2]		
Unnamed bee	*Lasioglossum perpunctatum*							X	X[2]		
Unnamed bee	*Lasioglossum planatum*							X	X[2]		
Unnamed bee	*Lasioglossum rozeni*							X	X[2]		
Unnamed bee	*Lasioglossum smilacinae*							X	X[2]		
Unnamed bee	*Lasioglossum taylorae*							X	X[2]		
Unnamed bee	*Lasioglossum versans*							X	X[2]		
Unnamed bee	*Lithurgus chrysurus*							X	X[2]		
Unnamed bee	*Macropis ciliata*							X	X[2]		
Unnamed bee	*Megachile addenda*							X	X[2]		
Unnamed bee	*Megachile apicalis*							X	X[2]		
Unnamed bee	*Megachile centuncularis*							X	X[2]		
Unnamed bee	*Megachile concinna*							X	X[2]		
Unnamed bee	*Megachile frigida*							X	X[2]		
Unnamed bee	*Megachile ingenua*							X	X[2]		
Unnamed bee	*Megachile integra*							X	X[2]		
Unnamed bee	*Megachile montivaga*							X	X[2]		
Unnamed bee	*Megachile mucida*							X	X[2]		
Unnamed bee	*Megachile petulans*							X	X[2]		
Unnamed bee	*Megachile relativa*							X	X[2]		
Unnamed bee	*Melissodes agilis*							X	X[2]		
Unnamed bee	*Melissodes communis*							X	X[2]		
Unnamed bee	*Melissodes denticulata*							X	X[2]		

(SGCN & the selection criteria fulfilled continued)

Common Name	Scientific Name	USFWS List	State List	NatureServe Global Rank	NatureServe State Rank	IUCN Red List	Regional SGCN List	Taxa Specific Criteria	Data Deficient	Priority SGCN	Focal Species
Unnamed bee	*Melissodes druriella*							X	X[2]		
Unnamed bee	*Nomada affabilis*							X	X[2]		
Unnamed bee	*Nomada bella*							X	X[2]		
Unnamed bee	*Nomada ceanothi*							X	X[2]		
Unnamed bee	*Nomada parva*							X	X[2]		
Unnamed bee	*Nomada perplexa*							X	X[2]		
Unnamed bee	*Nomada vegana*							X	X[2]		
Unnamed bee	*Osmia albiventris*							X	X[2]		
Unnamed bee	*Osmia collinsiae*							X	X[2]		
Unnamed bee	*Osmia distincta*							X	X[2]		
Unnamed bee	*Osmia sandhouseae*							X	X[2]		
Unnamed bee	*Osmia taurus*							X	X[2]		
Unnamed bee	*Paralictus cephalotes*							X	X[2]		
Unnamed bee	*Perdita bradleyi*							X	X[2]		
Unnamed bee	*Pseudoanthidium nanum*							X	X[2]		
Unnamed bee	*Pseudopanurgus andrenoides*							X	X[2]		
Unnamed bee	*Pseudopanurgus compositarum*							X	X[2]		
Unnamed bee	*Pseudopanurgus nebrascensis*							X	X[2]		
Unnamed bee	*Sphecodes autumnalis*							X	X[2]		
Unnamed bee	*Sphecodes banksii*							X	X[2]		
Unnamed bee	*Sphecodes carolinus*							X	X[2]		
Unnamed bee	*Sphecodes cressonii*							X	X[2]		
Unnamed bee	*Sphecodes davisii*							X	X[2]		
Unnamed bee	*Sphecodes fattigi*							X	X[2]		
Unnamed bee	*Sphecodes heraclei*							X	X[2]		
Unnamed bee	*Sphecodes levis*							X	X[2]		
Unnamed bee	*Sphecodes pimpinellae*							X	X[2]		
Unnamed bee	*Stelis labiata*							X	X[2]		
Unnamed bee	*Stelis lateralis*							X	X[2]		
Unnamed bee	*Stelis louisae*							X	X[2]		
Unnamed bee	*Trachusa dorsalis*							X	X[2]		
Unnamed bee	*Triepeolus cressonii*							X	X[2]		
Unnamed bee	*Triepeolus lunatus*							X	X[2]		
Unnamed cellophane bee	*Colletes bradleyi*							X	X[2]		
Unnamed cellophane bee	*Colletes compactus*							X	X[2]		
Unnamed cellophane bee	*Colletes consors*							X	X[2]		
Unnamed cellophane bee	*Colletes inaequalis*							X	X[2]		

(SGCN & the selection criteria fulfilled continued)

Common Name	Scientific Name	USFWS List	State List	NatureServe Global Rank	NatureServe State Rank	IUCN Red List	Regional SGCN List	Taxa Specific Criteria	Data Deficient	Priority SGCN	Focal Species
Unnamed cellophane bee	*Colletes simulans*							X	X[2]		
Unnamed cellophane bee	*Colletes speculiferus*							X	X[2]		
Unnamed cuckoo bee	*Epeolus lectoides*							X	X[2]		
Unnamed leaf-cutter bee	*Coelioxys alternata*							X	X[2]		
Unnamed leaf-cutter bee	*Coelioxys dolichos*							X	X[2]		
Unnamed leaf-cutter bee	*Coelioxys hunteri*							X	X[2]		
Unnamed leaf-cutter bee	*Coelioxys moesta*							X	X[2]		
Unnamed leaf-cutter bee	*Coelioxys octodentata*							X	X[2]		
Unnamed leaf-cutter bee	*Coelioxys porterae*							X	X[2]		
Unnamed leaf-cutter bee	*Coelioxys rufitarsis*							X	X[2]		
Unnamed solitary bee	*Anthophora abrupta*							X	X[2]		
Unnamed sweat bee	*Augochlorella persimilis*							X	X[2]		
Unnamed sweat bee	*Augochloropsis sumptuosa*							X	X[2]		
Unnamed yellow-masked bee	*Hylaeus illinoisensis*							X	X[2]		
Unnamed yellow-masked bee	*Hylaeus leptocephalus*							X	X[2]		
Unnamed yellow-masked bee	*Hylaeus schwarzii*							X	X[2]		
Unnamed yellow-masked bee	*Hylaeus sparsus*							X	X[2]		
Variable Cuckoo Bumble Bee	*Bombus variabilis*					X		X		X	X
Yellow Bumble Bee	*Bombus fervidus*					X		X		X	X
Yellow-banded Bumble Bee	*Bombus terricola*			X		X		X		X	X
Butterflies											
Aaron's Skipper	*Poanes aaroni*							X			
Acadian Hairstreak	*Satyrium acadicum*		X		X			X		X	
Appalachian Azure	*Celastrina neglectamajor*							X			
Appalachian Grizzled Skipper	*Pyrgus wyandot*		X	X	X			X		X	
Arctic Skipper	*Carterocephalus palaemon*							X			
Arogos Skipper	*Atrytone arogos arogos*		X	X	X			X		X	X
Baltimore Checkerspot	*Euphydryas phaeton*		X		X			X			
Bog Copper	*Lycaena epixanthe*							X			
Bronze Copper	*Lycaena hyllus*		X		X			X		X	
Checkered White	*Pontia protodice*		X		X			X			
Columbine Duskywing	*Erynnis lucilius*							X			
Common Roadside Skipper	*Amblyscirtes vialis*		X		X			X		X	
Compton Tortoise Shell	*Nymphalis vaualbum*		X					X			
Coral Hairstreak	*Satyrium titus*							X			
Dion Skipper	*Euphyes dion*							X			
Dotted Skipper	*Hesperia attalus slossonae*		X	X	X			X		X	X

(SGCN & the selection criteria fulfilled continued)

Common Name	Scientific Name	USFWS List	State List	NatureServe Global Rank	NatureServe State Rank	IUCN Red List	Regional SGCN List	Taxa Specific Criteria	Data Deficient	Priority SGCN	Focal Species
Dusted Skipper	*Atrytonopsis hianna*		X		X			X			
Early Hairstreak	*Erora laeta*							X	X		
Edwards' Hairstreak	*Satyrium edwardsii*							X			
Eyed Brown	*Satyrodes eurydice*		X					X			
Falcate Orange Tip	*Anthocharis midea*							X			
Frosted Elfin	*Callophrys irus*		X	X	X			X		X	X
Georgia Satyr	*Neonympha helicta*		X	X	X			X		X	X
Giant Swallowtail	*Papilio cresphontes*							X			
Gold-banded Skipper	*Autochton cellus*							X			
Gray Comma	*Polygonia progne*		X		X			X		X	
Great Purple Hairstreak	*Atlides halesus*							X			
Harris' Checkerspot	*Chlosyne harrisii*		X	X				X			
Harvester	*Feniseca tarquinius*							X			
Henry's Elfin	*Callophrys henrici*							X			
Hessel's Hairstreak	*Callophrys hesseli*		X	X	X			X		X	
Hickory Hairstreak	*Satyrium caryaevorum*		X		X			X			
Hoary Elfin	*Callophrys polios*		X		X			X		X	X
Leonard's Skipper	*Hesperia leonardus*		X		X			X		X	X
Long Dash	*Polites mystic*				X			X			
Mitchell's Satyr	*Neonympha mitchellii mitchellii*	X	X	X	X			X		X	
Monarch	*Danaus plexippus*	X	X		X			X		X	
Mottled Duskywing	*Erynnis martialis*							X			
Mustard (Eastern Veined) White	*Pieris oleracea*							X			
Northern Metalmark	*Calephelis borealis*		X	X	X			X		X	X
Northern Oak Hairstreak	*Satyrium favonius ontario*		X		X			X			
Pepper and Salt Skipper	*Amblyscirtes hegon*		X		X			X		X	
Persius Duskywing	*Erynnis persius*							X			
Rare Skipper	*Problema bulenta*		X	X	X			X		X	
Regal Fritillary	*Speyeria idalia*							X			
Silver-bordered Fritillary	*Boloria selene myrina*		X		X			X		X	
Silvery Checkerspot	*Chlosyne nycteis*							X			
Sleepy Dusky Wing	*Erynnis brizo*		X					X			
Two-spotted Skipper	*Euphyes bimacula*		X		X			X		X	
West Virginia White	*Pieris virginiensis*							X			
White M Hairstreak	*Parrhasius m-album*							X			

(SGCN & the selection criteria fulfilled continued)

Common Name	Scientific Name	USFWS List	State List	NatureServe Global Rank	NatureServe State Rank	IUCN Red List	Regional SGCN List	Taxa Specific Criteria	Data Deficient	Priority SGCN	Focal Species
Fairy Shrimp											
Eastern Fairy Shrimp	*Eubranchipus holmanii*		X							X	
Moths											
Aster Flower Moth	*Schinia septentrionalis*			X				X		X	
Barrens Dagger Moth	*Acronicta albarufa*			X				X			
Bird Dropping Moth	*Cerma cora*			X				X			
Boreal Fan Moth	*Brachionycha borealis*							X		X	
Broad-lined Erastra	*Erastria coloraria*			X	X			X		X	
Buchholz's Dart Moth	*Agrotis buchholzi*			X	X			X		X	X
Buchholz's Gray	*Hypomecis buchholzaria*			X				X		X	X
Carter's Noctuid Moth	*Spartiniphaga carterae*			X	X			X		X	X
Chain Fern Borer Moth	*Papaipema stenocelis*							X			
Coastal Bog Metarranthis	*Metarranthis pilosaria*				X			X			
Columbine Borer Moth	*Papaipema leucostigma*							X			
Consort Underwing	*Catocala consors*							X			
Culvers Root Borer Moth	*Papaipema sciata*			X	X			X		X	
Daecke's Pyralid Moth	*Crambus daeckellus*			X	X			X		X	X
Dark Stoneroot Borer Moth	*Papaipema duplicata*							X			
Doll's Merolonche	*Acronicta dolli*			X	X			X		X	
False Foxglove Seed	*Pyrrhia aurantiago*			X				X			
Golden Borer Moth	*Papaipema cerina*			X	X			X		X	
Graceful Clearwing	*Hemaris gracilis*			X	X			X			
Granitosa Fern Moth	*Callopistria granitosa*							X		X	
Hop Borer Moth	*Papaipema circumlucens*							X			
Lemmer's Noctuid Moth	*Lithophane lemmeri*			X				X		X	
Lizard Tail Borer Moth	*Parapamea buffaloensis*							X		X	
Marbled Underwing	*Catocala marmorata*			X				X			
Maritime Sunflower Borer	*Papaipema maritima*			X	X			X		X	X
Pine Barrens Speranza	*Speranza exonerata*			X				X			
Pink Sallow	*Psectraglaea carnosa*			X				X		X	X
Pink Streak	*Faronta rubripennis*			X				X		X	
Pitcher Plant Borer Moth	*Papaipema appassionata*							X		X	
Placentia Tiger Moth	*Grammia placentia*			X				X		X	
Plain Schizura	*Schizura apicalis*			X	X			X		X	
Precious Underwing	*Catocala pretiosa pretiosa*							X		X	
Sand Myrtle Looper/Pink	*Cyclophora culicaria*			X				X		X	X
Schweitzer's Buckmoth	*Hemileuca sp. 2*				X			X		X	

(SGCN & the selection criteria fulfilled continued)

Common Name	Scientific Name	USFWS List	State List	NatureServe Global Rank	NatureServe State Rank	IUCN Red List	Regional SGCN List	Taxa Specific Criteria	Data Deficient	Priority SGCN	Focal Species
Southern Ptichodis	*Ptichodis bistrigata*			X				X		X	
Stoneroot Flower Moth	*Psectrotarsia hebardi*							X			
Sunflower Borer Moth	*Papaipema necopina*							X			
Turtlehead Borer	*Papaipema nepheleptena*							X			
Umbellifer Borer	*Papaipema birdi*							X			
Underwing	*Catocala herodias gerhardi*			X				X		X	
Unnamed borer moth	*Papaipema eupatorii*							X		X	
Unnamed borer moth	*Papaipema harrisii*							X		X	X
Unnamed borer moth	*Papaipema lysimachiae*							X		X	
Unnamed borer moth	*Papaipema nelita*							X			
Unnamed borer moth	*Papaipema pterisii*							X		X	
Unnamed borer moth	*Papaipema rigida*							X		X	
Unnamed borer moth	*Papaipema unimoda*							X			
Unnamed geometer moth	*Apodrepanulatrix liberaria*			X				X		X	
Unnamed geometrid moth	*Lytrosis sinuosa*							X		X	
Unnamed geometrid moth	*Metarranthis lateritiaria*			X				X		X	
Unnamed hand-maid moth	*Datana ranaeceps*			X				X			
Unnamed moth	*Dichagyris reliqua*			X	X			X		X	
Unnamed noctuid moth	*Lithophane lepida*							X			
Unnamed notodontid moth	*Heterocampa varia*			X	X			X		X	X
Yellow Edged Pygarctia	*Pygarctia abdominalis*			X	X			X		X	
Yellow Stoneroot Borer	*Papaipema astuta*			X	X			X		X	
Mussels											
Brook Floater	*Alasmidonta varicosa*		X	X	X		X	X		X	X
Creeper	*Strophitus undulatus*		X							X	
Dwarf Wedgemussel	*Alasmidonta heterodon*	X	X	X	X	X	X			X	X
Eastern Lampmussel	*Lampsilis radiata*		X				X			X	X
Eastern Pondmussel	*Ligumia nasuta*		X				X			X	
Green Floater	*Lasmigona subviridis*		X	X	X		X	X		X	X
Tidewater Mucket	*Leptodea ochracea*		X	X	X	X	X			X	
Triangle Floater	*Alasmidonta undulata*		X				X			X	X
Yellow Lampmussel	*Lampsilis cariosa*		X	X	X	X	X			X	X
Odonates											
Allegheny River Cruiser	*Macromia alleghaniensis*		X					X		X	
Amber-winged Spreadwing	*Lestes eurinus*							X		X	
Arrowhead Spiketail	*Cordulegaster obliqua*		X					X		X	
Atlantic Bluet	*Enallagma doubledayi*							X			

(SGCN & the selection criteria fulfilled continued)

Common Name	Scientific Name	USFWS List	State List	NatureServe Global Rank	NatureServe State Rank	IUCN Red List	Regional SGCN List	Taxa Specific Criteria	Data Deficient	Priority SGCN	Focal Species
Banner Clubtail	*Gomphus apomyius*		X	X	X			X		X	
Beaverpond Clubtail	*Gomphus borealis*		X					X			
Brook Snaketail	*Ophiogomphus aspersus*		X					X		X	
Brush-tipped Emerald	*Somatochlora walshii*		X					X			
Cobra Clubtail	*Gomphus vastus*		X					X			
Coppery Emerald	*Somatochlora georgiana*		X	X	X			X		X	
Crimson-ringed Whiteface	*Leucorrhinia glacialis*		X					X			
Delta-spotted Spiketail	*Cordulegaster diastatops*							X			
Elfin Skimmer	*Nannothemis bella*							X			
Extra-striped Snaketail	*Ophiogomphus anomalus*		X					X		X	
Forcipate Emerald	*Somatochlora forcipata*		X					X			
Golden-winged Skimmer	*Libellula auripennis*		X					X			
Gray Petaltail	*Tachopteryx thoreyi*		X					X		X	
Green-faced Clubtail	*Gomphus viridifrons*		X	X	X			X		X	
Green-striped Darner	*Aeshna verticalis*							X			
Harpoon Clubtail	*Gomphus descriptus*		X					X		X	
Hudsonian Whiteface	*Leucorrhinia hudsonica*		X					X			
Kennedy's Emerald	*Somatochlora kennedyi*		X		X			X		X	
Lilypad Clubtail	*Arigomphus furcifer*							X		X	
Little Blue Dragonlet	*Erythrodiplax minuscula*							X			
Little Bluet	*Enallagma minusculum*							X		X	
Maine Snaketail	*Ophiogomphus mainensis*		X					X		X	
Martha's Pennant	*Celithemis martha*							X			
Midland Clubtail	*Gomphus fraternus*		X					X			
Mottled Darner	*Aeshna clepsydra*							X		X	
New England Bluet	*Enallagma laterale*		X	X	X			X		X	X
Ocellated Darner	*Boyeria grafiana*							X		X	
Pine Barrens Bluet	*Enallagma recurvatum*		X	X	X	X		X		X	X
Rapids Clubtail	*Gomphus quadricolor*		X	X	X			X		X	
Riffle Snaketail	*Ophiogomphus carolus*							X		X	
Robust Baskettail	*Epitheca spinosa*		X					X		X	X
Sable Clubtail	*Gomphus rogersi*		X					X		X	
Scarlet Bluet	*Enallagma pictum*		X	X	X	X		X		X	X
Seaside Dragonlet	*Erythrodiplax berenice*							X			
Septima's Clubtail	*Gomphus septima*		X	X	X			X		X	X
Ski-tailed Emerald	*Somatochlora elongata*		X					X			
Southern Pygmy Clubtail	*Lanthus vernalis*							X		X	

(SGCN & the selection criteria fulfilled continued)

Common Name	Scientific Name	USFWS List	State List	NatureServe Global Rank	NatureServe State Rank	IUCN Red List	Regional SGCN List	Taxa Specific Criteria	Data Deficient	Priority SGCN	Focal Species
Sparkling Jewelwing	*Calopteryx dimidiata*							X			
Spatterdock Darner	*Rhionaeschna mutata*		X					X			
Spine-crowned Clubtail	*Gomphus abbreviatus*			X	X			X		X	
Subarctic Darner	*Aeshna subarctica*		X		X			X			
Superb Jewelwing	*Calopteryx amata*		X					X		X	X
Taper-tailed Darner	*Gomphaeschna antilope*							X			
Tiger Spiketail	*Cordulegaster erronea*		X					X			
Uhler's Sundragon	*Helocordulia uhleri*							X			
Umber Shadowdragon	*Neurocordulia obsoleta*							X		X	
Williamson's Emerald	*Somatochlora williamsoni*		X					X			
Zebra Clubtail	*Stylurus scudderi*		X		X			X			
Tiger Beetles											
American Burying Beetle	*Nicrophorus americanus*	X	X	X	X	X		X		X	
Appalachian Tiger Beetle	*Cicindela ancocisconensis*			X	X		X	X		X	
Beach-dune Tiger Beetle	*Cicindela hirticollis*							X			
Cobblestone Tiger Beetle	*Cicindela marginipennis*			X	X	X	X	X		X	
Common Claybank Tiger Beetle	*Cicindela limbalis*							X		X	
Little White Tiger Beetle	*Cicindela lepida*			X	X		X	X		X	X
Margined Tiger Beetle	*Cicindela marginata*							X			
New Jersey Pine Barrens Tiger Beetle	*Cicindela patruela consentanea*			X	X		X	X		X	X
Northeastern Beach Tiger Beetle	*Cicindela dorsalis dorsalis*	X	X	X	X		X	X		X	X
Southeastern Beach Tiger Beetle	*Cicindela dorsalis media*				X		X	X		X	X
Unnamed tiger beetle	*Cicindela patruela*				X		X	X		X	

[1] Species was added to the SGCN list due to an official status change in the time since the original list was drafted in February 2015. Species did not advance beyond the SGCN list; thus their addition did not affect the Focal Species selection process.

[2] Data are under development by Rutgers University.

Appendix C: Species of Greatest Conservation Need, their Distribution within New Jersey, and Habitat Associations

Species of Greatest Conservation Need, their Distribution within New Jersey, and Habitat Associations

The following table lists New Jersey's 656 Species of Greatest Conservation Need (SGCN), the Landscape regions in which they occur, and the general habitat types with which each species is associated.

Species of Greatest Conservation Need		Landscape Region						Habitat Association										
Common Name	**Scientific Name**	**Atlantic Coast**	**Delaware Bay**	**Piedmont Inner Coastal Plain**	**Pinelands**	**Skylands**	**Marine**	**Forest**	**Grassland**	**Shrub**	**Wetlands**	**Beach and Dune**	**Barren and Exposed Rock**	**Tidal Mudflat**	**Coldwater Stream**	**Warmwater Stream**	**Marine Near Shore Zone**	**Marine Off Shore Zone**
Mammals																		
Marine Mammals																		
Bottlenose Dolphin	*Tursiops truncatus*	X					X										X	X
Fin Whale	*Balaenoptera physalus*						X										X	X
Gray Seal	*Halichoerus grypus*	X					X					X	X	X			X	X
Harbor Porpoise	*Phocoena phocoena*	X					X										X	X
Hooded Seal	*Cystophora cristata*	X					X					X	X	X			X	X
Humpback Whale	*Megaptera novaeangliae*						X										X	X
North Atlantic Right Whale	*Eubalaena glacialis*						X										X	X
Short-beaked Common Dolphin	*Delphinus delphis*						X											X
Short-finned Pilot Whale	*Globicephala macrorhynchus*						X											X
Striped Dolphin	*Stenella coeruleoalba*						X											X
Terrestrial Mammals																		
Allegheny Woodrat	*Neotoma magister*			X				X							X			
American Pygmy Shrew	*Sorex hoyi*					X		X			X							
Big Brown Bat	*Eptesicus fuscus*	X	X	X	X	X		X										
Bobcat	*Lynx rufus*					X		X		X	X							
Eastern Small-footed Myotis	*Myotis leibii*			X		X		X					X					
Fisher	*Martes pennanti*			X		X		X										
Hairy-tailed Mole	*Parascalops breweri*			X		X		X	X	X								
Hoary Bat	*Lasiurus cinereus*	X	X	X	X	X		X										
Indiana Bat	*Myotis sodalis*			X		X		X			X						X	X
Least Shrew	*Cryptotis parva*	X	X	X	X	X			X	X	X							
Little Brown Bat	*Myotis lucifugus*	X	X	X	X	X		X										
Long-tailed Shrew	*Sorex dispar*					X		X					X					
Marsh Rice Rat	*Oryzomys palustris*	X	X	X							X							
Meadow Jumping Mouse	*Zapus hudsonius*	X	X	X	X	X			X	X	X							
Northern Flying Squirrel	*Glaucomys sabrinus*					X		X										
Northern Myotis	*Myotis septentrionalis*	X	X	X	X	X		X			X							
Red Bat	*Lasiurus borealis*	X	X	X	X	X		X										
Silver-haired Bat	*Lasionycteris noctivagans*	X	X	X	X	X		X										
Smokey Shrew	*Sorex fumeus*			X		X		X										
Southern Bog Lemming	*Synaptomys cooperi*	X	X	X	X	X			X		X							
Star-nosed Mole	*Condylura cristata*	X	X	X	X	X					X							
Tricolored Bat	*Perimyotis subflavus*	X	X	X	X	X		X										
Tuckahoe Masked Shrew	*Sorex cinereus nigriculus*		X								X							
Water Shrew	*Sorex palustris*					X		X										
Woodland Jumping Mouse	*Napaeozapus insignis*			X		X		X										
Birds																		
Acadian Flycatcher	*Empidonax virescens*		X	X	X	X		X										
American Bittern	*Botaurus lentiginosus*	X	X	X	X	X					X							
American Black Duck	*Anas rubripes*	X	X	X	X	X		X			X				X	X		
American Coot	*Fulica americana*	X	X	X	X	X					X				X	X		
American Golden Plover	*Pluvialis dominica*	X	X	X				X		X	X		X					
American Kestrel	*Falco sparverius*		X	X	X	X			X									
American Oystercatcher	*Haematopus palliatus*	X	X	X							X	X		X				
American Woodcock	*Scolopax minor*	X	X	X	X	X		X		X	X							
Atlantic Brant	*Branta bernicla hrota*	X	X	X	X	X	X				X				X	X	X	

(SGCN, their distribution and associated habitats continued)

Species of Greatest Conservation Need		Landscape Region						Habitat Association										
Common Name	**Scientific Name**	**Atlantic Coast**	**Delaware Bay**	**Piedmont Inner Coastal Plain**	**Pinelands**	**Skylands**	**Marine**	**Forest**	**Grassland**	**Shrub**	**Wetlands**	**Beach and Dune**	**Barren and Exposed Rock**	**Tidal Mudflat**	**Coldwater Stream**	**Warmwater Stream**	**Marine Near Shore Zone**	**Marine Off Shore Zone**
Audubon's Shearwater	*Puffinus iherminieri*						X										X	X
Bald Eagle	*Haliaeetus leucocephalus*	X	X	X	X	X		X			X							
Baltimore Oriole	*Icterus galbula*	X	X	X	X	X		X										
Bank Swallow	*Riparia riparia*	X	X	X	X	X							X					
Barn Owl	*Tyto alba*	X	X	X		X			X		X							
Barred Owl	*Strix varia*		X	X	X	X		X			X							
Bay-breasted Warbler	*Dendroica castanea*	X	X	X	X	X		X		X								
Belted Kingfisher	*Megaceryle alcyon*	X	X	X	X	X					X				X	X		
Bicknell's Thrush	*Catharus bicknelli*	X	X	X	X	X		X		X								
Black Rail	*Laterallus jamaicensis*	X	X								X							
Black Scoter	*Melanitta nigra*	X	X	X	X	X	X				X				X	X	X	X
Black Skimmer	*Rynchops niger*	X	X	X			X				X	X					X	X
Black Tern	*Chlidonias niger*	X	X				X				X	X		X			X	X
Black-and-white Warbler	*Mniotilta varia*	X	X	X	X	X		X		X								
Black-bellied Plover	*Pluvialis squatarola*	X	X					X		X	X		X					
Black-billed Cuckoo	*Coccyzus erythropthalmus*	X	X	X	X	X		X		X								
Blackburnian Warbler	*Dendroica fusca*					X		X										
Black-crowned Night-heron	*Nycticorax nycticorax*	X	X	X	X	X		X		X	X			X	X	X		
Black-throated Blue Warbler	*Dendroica caerulescens*					X		X										
Black-throated Green Warbler	*Dendroica virens*				X	X		X										
Blue-headed (Solitary) Vireo	*Vireo solitarius*			X		X		X										
Blue-winged Warbler	*Vermivora pinus*	X	X	X	X	X		X	X	X								
Bobolink	*Dolichonyx oryzivorus*		X	X	X	X			X									
Bridled tern	*Onychoprion anaethetus*	X					X										X	X
Broad-winged Hawk	*Buteo platypterus*		X	X	X	X		X										
Brown Thrasher	*Toxostoma rufum*	X	X	X	X	X		X		X								
Bufflehead	*Bucephala albeola*	X	X	X	X	X	X				X				X	X	X	X
Canada Goose	*Branta canadensis*	X	X	X	X	X	X		X		X				X	X	X	X
Canada Warbler	*Wilsonia canadensis*			X		X		X		X								
Canvasback	*Aythya valisineria*	X	X	X	X	X					X				X	X		
Cape May Warbler	*Dendroica tigrina*	X	X	X	X	X		X		X								
Caspian Tern	*Hydroprogne caspia*	X	X				X				X	X		X			X	
Cattle Egret	*Bubulcus ibis*	X	X	X					X	X	X							
Cerulean Warbler	*Dendroica cerulea*			X	X	X		X		X								
Chimney Swift	*Chaetura pelagica*	X	X	X	X	X		X										
Chuck-will's-widow	*Caprimulgus carolinensis*	X	X					X										
Clapper Rail	*Rallus longirostris*	X	X	X							X							
Cliff Swallow	*Petrochelidon pyrrhonota*	X		X		X			X		X							
Common Eider	*Somateria mollissima*	X	X				X				X						X	
Common Gallinule	*Gallinula galeata*	X	X	X		X					X				X	X		
Common Loon	*Gavia immer*						X										X	X
Common Nighthawk	*Chordeiles minor*	X	X	X	X	X		X					X					
Common Tern	*Sterna hirundo*	X	X	X			X				X	X					X	
Cooper's Hawk	*Accipiter cooperii*		X	X	X	X		X										
Dickcissel	*Spiza americana*		X	X					X									
Dunlin	*Calidris alpina*	X	X							X	X		X					
Eastern Kingbird	*Tyrannus tyrannus*	X	X	X	X	X		X	X	X								
Eastern Meadowlark	*Sturnella magna*		X	X	X	X			X									
Eastern Towhee	*Pipilo erythrophthalmus*	X	X	X	X	X		X	X	X								
Eastern Wood-pewee	*Contopus virens*	X	X	X	X	X		X										
Field Sparrow	*Spizella pusilla*	X	X	X	X	X			X	X								

(SGCN, their distribution and associated habitats continued)

Species of Greatest Conservation Need		Landscape Region						Habitat Association										
Common Name	**Scientific Name**	**Atlantic Coast**	**Delaware Bay**	**Piedmont Inner Coastal Plain**	**Pinelands**	**Skylands**	**Marine**	**Forest**	**Grassland**	**Shrub**	**Wetlands**	**Beach and Dune**	**Barren and Exposed Rock**	**Tidal Mudflat**	**Coldwater Stream**	**Warmwater Stream**	**Marine Near Shore Zone**	**Marine Off Shore Zone**
Forster's Tern	*Sterna forsteri*	X	X	X			X				X	X					X	
Glossy Ibis	*Plegadis falcinellus*	X	X	X						X	X							
Golden Eagle	*Aquila chrysaetos*		X	X	X	X		X										
Golden-winged Warbler	*Vermivora chrysoptera*					X		X		X								
Grasshopper Sparrow	*Ammodramus savannarum*		X	X	X	X			X									
Gray Catbird	*Dumetella carolinensis*	X	X	X	X	X				X								
Gray-cheeked Thrush	*Catharus minimus*	X	X	X	X	X		X		X								
Great Blue Heron	*Ardea herodias*	X	X	X	X	X		X		X	X			X	X	X		
Great Crested Flycatcher	*Myiarchus crinitus*	X	X	X	X	X		X										
Greater Scaup	*Aythya marila*	X	X	X	X	X	X				X				X	X	X	
Greater Shearwater	*Puffinus gravis*						X										X	X
Greater Yellowlegs	*Tringa melanoleuca*	X	X							X	X		X					
Gull-billed Tern	*Gelochelidon nilotica*	X	X								X	X		X				
Henslow's Sparrow	*Ammodramus henslowii*		X	X	X	X			X									
Hooded Merganser	*Lophodytes cucullatus*	X	X	X	X	X	X				X				X	X	X	
Hooded Warbler	*Wilsonia citrina*		X	X	X	X		X										
Horned Grebe	*Podiceps auritus*	X	X	X			X				X				X	X	X	
Horned Lark	*Eremophila alpestris*	X	X	X	X	X			X				X					
Hudsonian Godwit	*Limosa haemastica*	X	X								X	X		X				
Kentucky Warbler	*Oporornis formosus*		X	X	X	X		X		X								
Killdeer	*Charadrius vociferus*	X	X	X	X	X			X									
King Rail	*Rallus elegans*	X	X	X	X	X					X							
Least Bittern	*Ixobrychus exilis*	X	X	X	X	X					X							
Least Flycatcher	*Empidonax minimus*	X	X	X	X	X		X		X								
Least Sandpiper	*Calidris minutilla*	X	X							X	X		X					
Least Tern	*Sternula antillarum*	X	X	X			X				X	X					X	
Lesser Scaup	*Aythya affinis*	X	X	X	X	X	X				X				X	X	X	
Lesser Yellowlegs	*Tringa flavipes*	X	X	X				X		X	X		X					
Little Blue Heron	*Egretta caerulea*	X	X	X	X						X							
Loggerhead Shrike	*Lanius ludovicianus migrans*	X	X						X	X								
Long-eared Owl	*Asio otus*		X	X	X	X		X										
Long-tailed Duck	*Clangula hyemalis*	X	X	X		X	X				X				X	X	X	X
Louisiana Waterthrush	*Seiurus motacilla*	X	X	X	X	X		X										
Manx Shearwater	*Puffinus puffinus*						X										X	X
Marbled Godwit	*Limosa fedoa*	X	X							X	X		X					
Marsh Wren	*Cistothorus palustris*	X	X	X	X	X					X							
Nashville Warbler	*Oreothlypis ruficapilla*					X		X		X								
Nelson's Sharp-tailed Sparrow	*Ammodramus nelsoni*	X	X	X							X							
Northern Bobwhite	*Colinus virginianus*		X	X	X			X	X	X								
Northern Flicker	*Colaptes auratus*	X	X	X	X	X		X										
Northern Gannet	*Morus bassanus*						X										X	X
Northern Goshawk	*Accipiter gentilis*			X		X		X			X							
Northern Harrier	*Circus cyaneus*	X	X	X		X			X		X							
Northern Parula	*Parula americana*	X	X	X	X	X		X										
Northern Pintail	*Anas acuta*	X	X	X	X	X					X				X	X		
Northern Saw-Whet Owl	*Aegolius acadicus*	X	X	X	X	X		X										
Olive-sided Flycatcher	*Contopus cooperi*	X	X	X	X	X		X		X								
Osprey	*Pandion haliaetus*	X	X	X	X	X					X	X						
Peregrine Falcon	*Falco peregrinus*	X	X	X		X					X	X						
Pied-billed Grebe	*Podilymbus podiceps*	X	X	X	X	X					X				X	X		
Piping Plover	*Charadrius melodus*	X										X		X				

(SGCN, their distribution and associated habitats continued)

Species of Greatest Conservation Need		Landscape Region						Habitat Association										
Common Name	**Scientific Name**	**Atlantic Coast**	**Delaware Bay**	**Piedmont Inner Coastal Plain**	**Pinelands**	**Skylands**	**Marine**	**Forest**	**Grassland**	**Shrub**	**Wetlands**	**Beach and Dune**	**Barren and Exposed Rock**	**Tidal Mudflat**	**Coldwater Stream**	**Warmwater Stream**	**Marine Near Shore Zone**	**Marine Off Shore Zone**
Prairie Warbler	*Dendroica discolor*	X	X	X	X	X				X								
Prothonotary Warbler	*Protonotaria citrea*		X	X	X			X										
Purple Finch	*Carpodacus purpureus*			X		X		X										
Purple Martin	*Progne subis*	X	X	X	X	X		X	X	X	X	X	X					
Purple Sandpiper	*Calidris maritima*	X								X	X		X					
Razorbill	*Alca torda*						X										X	X
Red Knot	*Calidris canutus*	X	X							X	X		X					X
Red-headed Woodpecker	*Melanerpes erythrocephalus*	X	X	X	X	X		X			X							
Red-shouldered Hawk	*Buteo lineatus*		X	X	X	X		X			X							
Red-throated Loon	*Gavia stellata*						X										X	X
Roseate Tern	*Sterna dougallii dougalli*	X					X				X	X		X			X	
Rose-breasted Grosbeak	*Pheucticus ludovicianus*			X	X	X		X		X								
Royal Tern	*Sterna maxima*	X	X				X				X	X		X			X	
Ruddy Duck	*Oxyura jamaicensis*	X	X	X	X	X	X				X				X	X	X	X
Ruddy Turnstone	*Arenaria interpres*	X	X							X	X		X					X
Ruffed Grouse	*Bonasa umbellus*					X		X		X								
Rusty Blackbird	*Euphagus carolinus*	X	X	X	X	X		X			X							
Saltmarsh Sparrow	*Ammodramus caudacutus*	X	X	X							X							
Sanderling	*Calidris alba*	X	X							X	X		X					
Savannah Sparrow	*Passerculus sandwichensis*	X	X	X	X	X			X									
Scarlet Tanager	*Piranga olivacea*	X	X	X	X	X		X		X								
Seaside Sparrow	*Ammodramus maritimus*	X	X	X							X							
Sedge Wren	*Cistothorus platensis*	X	X	X	X	X			X		X							
Semipalmated Sandpiper	*Calidris pusilla*	X	X							X	X		X					
Sharp-shinned Hawk	*Accipiter striatus*		X	X	X	X		X										
Short-billed Dowitcher	*Limnodromus griseus*	X	X							X	X		X					
Short-eared Owl	*Asio flammeus*	X	X			X			X									
Snowy Egret	*Egretta thula*	X	X	X	X						X							
Solitary Sandpiper	*Tringa solitaria*	X	X	X	X	X		X	X	X	X							
Sora	*Porzana carolina*	X	X	X		X					X				X	X		
Spotted Sandpiper	*Actitis macularius*	X	X	X		X					X	X		X				
Summer Tanager	*Piranga rubra*		X	X	X			X										
Surf Scoter	*Melanitta perspicillata*	X	X	X	X	X	X				X				X	X	X	X
Swainson's Warbler	*Limnothlypis swainsonii*							X										
Tricolored Heron	*Egretta tricolor*	X	X	X							X							
Upland Sandpiper	*Bartramia longicauda*	X	X	X	X	X			X									
Veery	*Catharus fuscescens*		X	X	X	X		X		X								
Vesper Sparrow	*Pooecetes gramineus*	X	X	X	X	X			X									
Virginia Rail	*Rallus limicola*	X	X	X		X					X							
Whimbrel	*Numenius phaeopus*	X	X								X	X		X				
Whip-poor-will	*Caprimulgus vociferus*	X	X	X	X	X		X										
White-rumped Sandpiper	*Calidris fuscicollis*	X	X							X	X		X					
White-throated Sparrow	*Zonotrichia albicollis*	X	X	X	X	X		X		X								
White-winged Scoter	*Melanitta fusca*	X	X	X	X	X	X				X				X	X	X	X
Willet	*Tringa semipalmata*	X	X								X	X		X				
Willow Flycatcher	*Empidonax traillii*	X	X	X	X	X				X								
Wilson's Phalarope	*Phalaropus tricolor*	X	X							X	X							
Winter Wren	*Troglodytes hiemalis*					X		X										
Wood Duck	*Aix sponsa*	X	X	X	X	X		X			X				X	X		
Wood Thrush	*Hylocichla mustelina*	X	X	X	X	X		X		X								
Worm-eating Warbler	*Helmitheros vermivorum*	X	X	X	X	X		X										

(SGCN, their distribution and associated habitats continued)

Species of Greatest Conservation Need		Landscape Region						Habitat Association									
Common Name	**Scientific Name**	**Atlantic Coast**	**Delaware Bay**	**Piedmont Inner Coastal Plain**	**Pinelands**	**Skylands**	**Marine**	**Forest**	**Grassland**	**Shrub**	**Wetlands**	**Beach and Dune**	**Barren and Exposed Rock**	**Tidal Mudflat**	**Coldwater Stream**	**Warmwater Stream**	**Marine Near Shore Zone**	**Marine Off Shore Zone**
Yellow-bellied Flycatcher	*Empidonax flaviventris*	X	X	X	X	X		X										
Yellow-billed Cuckoo	*Coccyzus americanus*	X	X	X	X	X		X										
Yellow-breasted Chat	*Icteria virens*	X	X	X	X	X			X	X								
Yellow-crowned Night-heron	*Nyctanassa violacea*	X	X	X				X		X	X			X				
Yellow-throated Vireo	*Vireo flavifrons*		X	X	X	X		X										
Reptiles & Amphibians																		
Amphibians																		
Allegheny Dusky Salamander	*Desmognathus ochrophaeus*					X		X			X				X			
Atlantic Coast Leopard Frog	*Lithobates kauffeldi*	X	X	X		X					X					X		
Blue-spotted Salamander	*Ambystoma laterale*			X		X		X			X							
Carpenter Frog	*Lithobates virgatipes*	X	X	X	X			X		X	X							
Cope's Gray Treefrog	*Hyla chrysoscelis*	X	X	X				X			X							
Eastern Mud Salamander	*Pseudotriton montanus montanus*			X							X					X		
Eastern Spadefoot	*Scaphiopus holbrookii*	X	X		X	X		X	X		X							
Eastern Tiger Salamander	*Ambystoma tigrinum tigrinum*	X	X		X			X			X							
Four-toed Salamander	*Hemidactylium scutatum*		X	X	X	X		X			X							
Fowler's Toad	*Anaxyrus fowleri*	X	X	X	X	X		X			X							
Green Treefrog	*Hyla cinerea*		X															
Jefferson Salamander	*Ambystoma jeffersonianum*					X		X			X							
Longtail Salamander	*Eurycea longicauda longicauda*			X		X		X			X				X			
Marbled Salamander	*Ambystoma opacum*				X	X		X			X							
New Jersey Chorus Frog	*Pseudacris kalmi*	X	X	X	X	X		X		X	X							
Northern Cricket Frog	*Acris crepitans crepitans*	X	X															
Northern Dusky Salamander	*Desmognathus fuscus*			X	X	X		X			X				X	X		
Northern Red Salamander	*Pseudotriton ruber ruber*			X	X	X		X			X							
Northern Spring Salamander	*Gyrinophilus porphyriticus porphyriticus*					X		X			X				X			
Northern Two-lined Salamander	*Eurycea bislineata*			X		X					X				X	X		
Pine Barrens Treefrog	*Hyla andersonii*	X	X		X			X		X	X							
Slimy Salamander	*Plethodon glutinosus*			X		X												
Southern Leopard Frog	*Lithobates sphenocephala*	X	X	X	X			X			X							
Spotted Salamander	*Ambystoma maculatum*			X		X		X			X							
Reptiles																		
Atlantic Green Turtle	*Chelonia mydas*	X	X				X										X	X
Atlantic Hawksbill	*Eretmochelys imbricata*						X											X
Atlantic Leatherback	*Dermochelys coriacea*	X					X										X	X
Atlantic Loggerhead	*Caretta caretta*	X	X				X										X	X
Atlantic Ridley	*Lepidochelys kempii*	X	X				X										X	X
Bog Turtle	*Glyptemys muhlenbergii*			X	X	X		X			X							
Corn Snake	*Elaphe guttata guttata*	X	X		X			X		X								
Eastern Box Turtle	*Terrapene carolina carolina*	X	X	X	X	X		X	X	X	X							
Eastern Fence Lizard	*Sceloporus undulatus*	X	X	X	X			X										
Eastern Hognose Snake	*Heterodon platirhinos*			X	X	X		X		X								
Eastern Kingsnake	*Lampropeltis getula getula*	X	X	X	X			X		X	X							
Eastern Mud Turtle	*Kinosternon subrubrum*	X	X	X	X	X					X					X		
Eastern Painted Turtle	*Chrysemys picta picta*		X	X	X	X			X						X	X		
Eastern Ratsnake	*Elaphe obsoleta*	X	X	X	X	X		X	X	X	X		X					
Eastern Redbelly Turtle	*Pseudemys rubriventris*	X	X	X	X				X		X				X	X		
Eastern Ribbon Snake	*Thamnophis sauritus sauritus*	X	X	X	X	X					X				X	X		
Eastern Smooth Earth Snake	*Virginia valeriae valeriae*	X	X	X	X			X		X								
Eastern Worm Snake	*Carphophis amoenus amoenus*	X	X	X	X	X		X		X			X					

(SGCN, their distribution and associated habitats continued)

Species of Greatest Conservation Need		Landscape Region						Habitat Association									
Common Name	**Scientific Name**	**Atlantic Coast**	**Delaware Bay**	**Piedmont Inner Coastal Plain**	**Pinelands**	**Skylands**	**Marine**	**Forest**	**Grassland**	**Shrub**	**Wetlands**	**Beach and Dune**	**Barren and Exposed Rock**	**Tidal Mudflat**	**Coldwater Stream**	**Warmwater Stream**	**Marine Near Shore Zone**	**Marine Off Shore Zone**
Five-lined Skink	*Eumeces fasciatus*	X	X	X	X	X		X			X		X					
Ground Skink	*Scincella lateralis*	X	X	X	X			X										
Northern Black Racer	*Coluber constrictor constrictor*	X	X	X	X	X		X	X	X			X					
Northern Brown Snake	*Storeria dekayi dekayi*	X	X	X	X	X		X		X								
Northern Copperhead Snake	*Agkistrodon contortrix mokasen*			X		X		X	X	X	X		X					
Northern Diamondback Terrapin	*Malaclemys terrapin terrapin*	X	X		X		X				X	X					X	
Northern Pine Snake	*Pituophis melanoleucus*	X	X		X			X		X	X							
Northern Ringneck Snake	*Diadophis punctatus edwardsii*	X	X	X	X	X		X		X			X					
Northern Scarlet Snake	*Cemophora coccinea copei*	X	X		X			X										
Queen Snake	*Regina septemvittata*															X		
Rough Green Snake	*Opheodrys aestivus*		X		X			X		X								
Smooth Green Snake	*Liochlorophis vernalis*			X		X			X	X								
Spotted Turtle	*Clemmys guttata*	X	X	X	X	X		X			X				X	X		
Timber Rattlesnake	*Crotalus horridus horridus*		X		X	X		X		X	X		X			X		
Wood Turtle	*Glyptemys insculpta*			X		X		X	X	X	X							
Fish																		
Freshwater Fish																		
American Brook Lamprey	*Lethenteron appendix*		X	X	X	X									X	X		
Banded Sunfish	*Enneacanthus obesus*		X	X	X										X	X		
Blackbanded Sunfish	*Enneacanthus chaetodon*		X		X											X		
Bluespotted Sunfish	*Enneacanthus gloriosus*		X	X	X	X										X		
Bridle Shiner	*Notropis bifrenatus*			X		X									X	X		
Brook Trout	*Salvelinus fontinalis*			X		X									X			
Comely Shiner	*Notropis amoenus*			X		X										X		
Cutlips Minnow	*Exoglossum maxillingua*			X		X									X			
Eastern Mudminnow	*Umbra pygmaea*		X	X	X	X										X		
Fallfish	*Semotilus corporalis*		X	X		X									X	X		
Ironcolor Shiner	*Notropis chalybaeus*		X	X	X	X									X	X	X	
Margined Madtom	*Noturus insignis*		X	X		X									X	X		
Mud Sunfish	*Acantharchus pomotis*		X	X	X	X										X	X	X
Northern Hog Sucker	*Hypentelium nigricans*					X									X			
Pirate Perch	*Aphredoderus sayanus*		X	X	X											X		
Redbreast Sunfish	*Lepomis auritus*		X	X		X										X		
Satinfin Shiner	*Cyprinella analostana*		X	X		X									X	X		
Shield Darter	*Percina peltata*			X		X									X	X		
Slimy Sculpin	*Cottus cognatus*					X									X			
Spotfin Shiner	*Cyprinella spiloptera*			X		X									X	X		
Swallowtail Shiner	*Notropis procne*			X		X									X	X		
Swamp Darter	*Etheostoma fusiforme*		X	X	X											X		
Tadpole Madtom	*Noturus gyrinus*		X	X	X	X										X		
White Catfish	*Ameiurus catus*		X	X	X	X										X		
Yellow Bullhead	*Ameiurus natalis*		X	X	X	X										X		
Marine Fish																		
Alewife	*Alosa pseudoharengus*	X	X	X			X										X	
American Eel	*Anguilla rostrata*	X	X				X										X	X
American Sand Lance	*Ammodytes americanus*						X										X	
American Shad	*Alosa sapidissima*	X	X				X										X	
Atlantic Angel Shark	*Squatina dumeril*						X										X	X
Atlantic Cod	*Gadus morhua*						X											X
Atlantic Herring	*Clupea harengus*						X											X
Atlantic Mackerel	*Scomber scombrus*						X											X

(SGCN, their distribution and associated habitats continued)

Species of Greatest Conservation Need		Landscape Region						Habitat Association										
Common Name	**Scientific Name**	**Atlantic Coast**	**Delaware Bay**	**Piedmont Inner Coastal Plain**	**Pinelands**	**Skylands**	**Marine**	**Forest**	**Grassland**	**Shrub**	**Wetlands**	**Beach and Dune**	**Barren and Exposed Rock**	**Tidal Mudflat**	**Coldwater Stream**	**Warmwater Stream**	**Marine Near Shore Zone**	**Marine Off Shore Zone**
Atlantic Menhaden	*Brevoortia tyrannus*	X	X				X										X	X
Atlantic Silverside	*Menidia menidia*	X	X				X										X	
Atlantic Sturgeon	*Acipenser oxyrinchus*	X	X	X			X									X	X	X
Atlantic Tomcod	*Microgadus tomcod*						X											X
Barndoor Skate	*Dipturus laevis*						X										X	X
Basking Shark	*Cetorhinus maximus*						X										X	X
Bigeye Thresher Shark	*Alopias superciliosus*						X										X	X
Black Drum	*Pogonias cromis*		X				X										X	X
Black Sea Bass	*Centropristis striata*		X				X										X	X
Blue Shark	*Prionace glauca*						X										X	X
Blueback Herring	*Alosa aestivalis*	X	X	X			X										X	
Bluefish	*Pomatomus saltatrix*	X	X				X										X	X
Butterfish	*Peprilus triacanthus*						X										X	X
Common Thresher Shark	*Alopias vulpinus*						X										X	X
Cunner	*Tautogolabrus adspersus*						X										X	X
Dusky Shark	*Carcharhinus obscurus*						X										X	X
Eastern Silvery Minnow	*Hybognathus regius*	X	X															
Fourspine Stickleback	*Apeltes quadracus*	X																
Fourspot Flounder	*Paralichthys oblongus*						X										X	X
Goosefish	*Lophius americanus*						X										X	X
Hickory Shad	*Alosa mediocris*	X	X				X										X	
Little Skate	*Leucoraja erinacea*						X										X	X
Longfin Mako Shark	*Isurus paucus*						X										X	X
Longfin Squid	*Loligo pealei*						X										X	X
Mummichog	*Fundulus heteroclitus*	X	X															
Narrowtooth Shark	*Carcharhinus brachyurus*						X										X	X
Night Shark	*Carcharhinus signatus*						X										X	X
Northern Puffer	*Sphoeroides maculatus*		X				X										X	
Northern Searobin	*Prionotus carolinus*		X				X										X	X
Ocean Pout	*Zoarces americanus*						X										X	X
Oyster Toadfish	*Opsanus tau*		X				X										X	
Porbeagle Shark	*Lamna nasus*						X										X	X
Red Drum	*Sciaenops ocellatus*						X										X	X
Red Hake	*Urophycis chuss*						X										X	X
Roughtail Stingray	*Dasyatis centroura*		X				X										X	X
Sand Tiger Shark	*Carcharias taurus*						X										X	X
Sandbar Shark	*Carcharhinus milberti*						X										X	X
Scalloped Hammerhead	*Sphyrna lewini*						X										X	X
Scup	*Stenotomus chrysops*						X										X	X
Sea Raven	*Hemitripterus americanus*						X										X	X
Sharpnose Sevengill Shark	*Heptranchias perlo*						X										X	X
Shortfin Mako	*Isurus oxyrinchus*						X										X	X
Shortnose Sturgeon	*Acipenser brevirostrum*	X	X	X			X									X	X	
Silver Hake	*Merluccius bilinearis*						X										X	X
Sixgill Shark	*Hexanchus griseus*						X										X	X
Smooth Dogfish	*Mustelus canis*		X				X										X	X
Smooth Hammerhead	*Sphyrna zygaena*						X										X	X
Spiny Dogfish	*Squalus acanthias*		X				X										X	X
Spotfin Killifish	*Fundulus luciae*	X	X															
Striped Bass	*Morone saxatilis*	X	X				X										X	X
Striped Killifish	*Fundulus majalis*	X	X															

(SGCN, their distribution and associated habitats continued)

Species of Greatest Conservation Need		Landscape Region						Habitat Association										
Common Name	**Scientific Name**	**Atlantic Coast**	**Delaware Bay**	**Piedmont Inner Coastal Plain**	**Pinelands**	**Skylands**	**Marine**	**Forest**	**Grassland**	**Shrub**	**Wetlands**	**Beach and Dune**	**Barren and Exposed Rock**	**Tidal Mudflat**	**Coldwater Stream**	**Warmwater Stream**	**Marine Near Shore Zone**	**Marine Off Shore Zone**
Striped Searobin	*Prionotus evolans*		X				X										X	X
Summer Flounder	*Paralichthys dentatus*	X	X				X										X	X
Tautog	*Tautoga onitis*						X										X	X
Thorny skate	*Amblyraja radiata*						X										X	X
Weakfish	*Cynoscion regalis*	X	X				X										X	X
Whale Shark	*Rhincodon typus*						X										X	X
Windowpane	*Scophthalmus aquosus*		X				X										X	X
Winter Flounder	*Pseudopleuronectes americanus*	X	X				X										X	X
Winter Skate	*Leucoraja ocellata*						X										X	X
Invertebrates																		
Arthropods																		
Horseshoe Crab	*Limulus polyphemus*	X	X				X										X	
Bees																		
American Bumble Bee	*Bombus pensylvanicus*		X	X	X	X		X	X	X								
Ashton Cuckoo Bumble Bee	*Bombus bohemicus*		X	X	X	X		X	X	X								
Macropis Cuckoo Bee	*Epeoloides pilosula*																	
Orchard Mason Bee	*Osmia lignaria*																	
Rusty Patched Bumble Bee	*Bombus affinis*		X	X	X	X		X	X	X								
Sanderson Bumble Bee	*Bombus sandersoni*		X		X													
Southern Plains Bumble Bee	*Bombus fraternus*		X	X	X	X		X	X	X								
Unnamed bee	*Andrena ceanothi*																	
Unnamed bee	*Andrena confederata*																	
Unnamed bee	*Andrena duplicata*																	
Unnamed bee	*Andrena frigida*																	
Unnamed bee	*Andrena fulvipennis*																	
Unnamed bee	*Andrena geranii*																	
Unnamed bee	*Andrena helianthi*																	
Unnamed bee	*Andrena hirticincta*																	
Unnamed bee	*Andrena ilicis*																	
Unnamed bee	*Andrena integra*																	
Unnamed bee	*Andrena krigiana*																	
Unnamed bee	*Andrena neonana*																	
Unnamed bee	*Andrena nivalis*																	
Unnamed bee	*Andrena personata*																	
Unnamed bee	*Andrena placata*																	
Unnamed bee	*Andrena platyparia*																	
Unnamed bee	*Andrena rudbeckiae*																	
Unnamed bee	*Andrena screpteropsis*																	
Unnamed bee	*Andrena uvulariae*																	
Unnamed bee	*Andrena ziziaeformis*																	
Unnamed bee	*Ceratina zadontomerus*																	
Unnamed bee	*Heriades leavitti*																	
Unnamed bee	*Hoplitis spoliata*																	
Unnamed bee	*Lasioglossum anomalum*																	
Unnamed bee	*Lasioglossum apopkense*																	
Unnamed bee	*Lasioglossum arantium*																	
Unnamed bee	*Lasioglossum atwoodi*																	
Unnamed bee	*Lasioglossum birkmanni*																	
Unnamed bee	*Lasioglossum ceanothi*																	
Unnamed bee	*Lasioglossum cinctipes*																	
Unnamed bee	*Lasioglossum creberrimum*																	

(SGCN, their distribution and associated habitats continued)

Species of Greatest Conservation Need		Landscape Region						Habitat Association										
Common Name	**Scientific Name**	**Atlantic Coast**	**Delaware Bay**	**Piedmont Inner Coastal Plain**	**Pinelands**	**Skylands**	**Marine**	**Forest**	**Grassland**	**Shrub**	**Wetlands**	**Beach and Dune**	**Barren and Exposed Rock**	**Tidal Mudflat**	**Coldwater Stream**	**Warmwater Stream**	**Marine Near Shore Zone**	**Marine Off Shore Zone**
Unnamed bee	*Lasioglossum ellisiae*																	
Unnamed bee	*Lasioglossum heterognathum*																	
Unnamed bee	*Lasioglossum katherineae*																	
Unnamed bee	*Lasioglossum nymphale*																	
Unnamed bee	*Lasioglossum paradmirandum*																	
Unnamed bee	*Lasioglossum pectinatum*																	
Unnamed bee	*Lasioglossum perpunctatum*																	
Unnamed bee	*Lasioglossum planatum*																	
Unnamed bee	*Lasioglossum rozeni*																	
Unnamed bee	*Lasioglossum smilacinae*																	
Unnamed bee	*Lasioglossum taylorae*																	
Unnamed bee	*Lasioglossum versans*																	
Unnamed bee	*Lithurgus chrysurus*																	
Unnamed bee	*Macropis ciliata*																	
Unnamed bee	*Megachile addenda*																	
Unnamed bee	*Megachile apicalis*																	
Unnamed bee	*Megachile centuncularis*																	
Unnamed bee	*Megachile concinna*																	
Unnamed bee	*Megachile frigida*																	
Unnamed bee	*Megachile ingenua*																	
Unnamed bee	*Megachile integra*																	
Unnamed bee	*Megachile montivaga*																	
Unnamed bee	*Megachile mucida*																	
Unnamed bee	*Megachile petulans*																	
Unnamed bee	*Megachile relativa*																	
Unnamed bee	*Melissodes agilis*																	
Unnamed bee	*Melissodes communis*																	
Unnamed bee	*Melissodes denticulata*																	
Unnamed bee	*Melissodes druriella*																	
Unnamed bee	*Nomada affabilis*																	
Unnamed bee	*Nomada bella*																	
Unnamed bee	*Nomada ceanothi*																	
Unnamed bee	*Nomada parva*																	
Unnamed bee	*Nomada perplexa*																	
Unnamed bee	*Nomada vegana*																	
Unnamed bee	*Osmia albiventris*																	
Unnamed bee	*Osmia collinsiae*																	
Unnamed bee	*Osmia distincta*																	
Unnamed bee	*Osmia sandhouseae*																	
Unnamed bee	*Osmia taurus*																	
Unnamed bee	*Paralictus cephalotes*																	
Unnamed bee	*Perdita bradleyi*																	
Unnamed bee	*Pseudoanthidium nanum*																	
Unnamed bee	*Pseudopanurgus andrenoides*																	
Unnamed bee	*Pseudopanurgus compositarum*																	
Unnamed bee	*Pseudopanurgus nebrascensis*																	
Unnamed bee	*Sphecodes autumnalis*																	
Unnamed bee	*Sphecodes banksii*																	
Unnamed bee	*Sphecodes carolinus*																	
Unnamed bee	*Sphecodes cressonii*																	
Unnamed bee	*Sphecodes davisii*																	

(SGCN, their distribution and associated habitats continued)

Species of Greatest Conservation Need		Landscape Region						Habitat Association										
Common Name	**Scientific Name**	**Atlantic Coast**	**Delaware Bay**	**Piedmont Inner Coastal Plain**	**Pinelands**	**Skylands**	**Marine**	**Forest**	**Grassland**	**Shrub**	**Wetlands**	**Beach and Dune**	**Barren and Exposed Rock**	**Tidal Mudflat**	**Coldwater Stream**	**Warmwater Stream**	**Marine Near Shore Zone**	**Marine Off Shore Zone**
Unnamed bee	*Sphecodes fattigi*																	
Unnamed bee	*Sphecodes heraclei*																	
Unnamed bee	*Sphecodes levis*																	
Unnamed bee	*Sphecodes pimpinellae*																	
Unnamed bee	*Stelis labiata*																	
Unnamed bee	*Stelis lateralis*																	
Unnamed bee	*Stelis louisae*																	
Unnamed bee	*Trachusa dorsalis*																	
Unnamed bee	*Triepeolus cressonii*																	
Unnamed bee	*Triepeolus lunatus*																	
Unnamed cellophane bee	*Colletes bradleyi*																	
Unnamed cellophane bee	*Colletes compactus*																	
Unnamed cellophane bee	*Colletes consors*																	
Unnamed cellophane bee	*Colletes inaequalis*																	
Unnamed cellophane bee	*Colletes simulans*																	
Unnamed cellophane bee	*Colletes speculiferus*																	
Unnamed cuckoo bee	*Epeolus lectoides*																	
Unnamed leaf-cutter bee	*Coelioxys alternata*																	
Unnamed leaf-cutter bee	*Coelioxys dolichos*																	
Unnamed leaf-cutter bee	*Coelioxys hunteri*																	
Unnamed leaf-cutter bee	*Coelioxys moesta*																	
Unnamed leaf-cutter bee	*Coelioxys octodentata*																	
Unnamed leaf-cutter bee	*Coelioxys porterae*																	
Unnamed leaf-cutter bee	*Coelioxys rufitarsis*																	
Unnamed solitary bee	*Anthophora abrupta*																	
Unnamed sweat bee	*Augochlorella persimilis*																	
Unnamed sweat bee	*Augochloropsis sumptuosa*																	
Unnamed yellow-masked bee	*Hylaeus illinoisensis*																	
Unnamed yellow-masked bee	*Hylaeus leptocephalus*																	
Unnamed yellow-masked bee	*Hylaeus schwarzii*																	
Unnamed yellow-masked bee	*Hylaeus sparsus*																	
Variable Cuckoo Bumble Bee	*Bombus variabilis*		X	X	X	X		X	X	X								
Yellow Bumble Bee	*Bombus fervidus*		X	X	X	X		X	X	X								
Yellow-banded Bumble Bee	*Bombus terricola*		X	X	X	X		X	X	X								
Butterflies																		
Aaron's Skipper	*Poanes aaroni*	X	X		X			X		X								
Acadian Hairstreak	*Satyrium acadicum*					X		X			X							
Appalachian Azure	*Celastrina neglectamajor*					X		X	X									
Appalachian Grizzled Skipper	*Pyrgus wyandot*					X		X	X									
Arctic Skipper	*Carterocephalus palaemon*					X		X										
Arogos Skipper	*Atrytone arogos arogos*			X	X	X			X		X							
Baltimore Checkerspot	*Euphydryas phaeton*					X		X		X								
Bog Copper	*Lycaena epixanthe*		X		X	X				X								
Bronze Copper	*Lycaena hyllus*		X			X			X		X							
Checkered White	*Pontia protodice*		X	X					X									
Columbine Duskywing	*Erynnis lucilius*					X		X	X									
Common Roadside Skipper	*Amblyscirtes vialis*		X		X	X		X										
Compton Tortoise Shell	*Nymphalis vaualbum*		X	X		X			X									
Coral Hairstreak	*Satyrium titus*		X	X	X	X		X	X									
Dion Skipper	*Euphyes dion*		X	X	X	X		X		X								
Dotted Skipper	*Hesperia attalus slossonae*		X		X				X									

(SGCN, their distribution and associated habitats continued)

Species of Greatest Conservation Need		Landscape Region						Habitat Association										
Common Name	**Scientific Name**	**Atlantic Coast**	**Delaware Bay**	**Piedmont Inner Coastal Plain**	**Pinelands**	**Skylands**	**Marine**	**Forest**	**Grassland**	**Shrub**	**Wetlands**	**Beach and Dune**	**Barren and Exposed Rock**	**Tidal Mudflat**	**Coldwater Stream**	**Warmwater Stream**	**Marine Near Shore Zone**	**Marine Off Shore Zone**
Dusted Skipper	*Atrytonopsis hianna*		X	X	X	X		X										
Early Hairstreak	*Erora laeta*					X												
Edwards' Hairstreak	*Satyrium edwardsii*		X		X	X			X									
Eyed Brown	*Satyrodes eurydice*					X				X								
Falcate Orange Tip	*Anthocharis midea*		X	X	X	X		X										
Frosted Elfin	*Callophrys irus*		X	X	X				X	X								
Georgia Satyr	*Neonympha helicta*				X					X	X							
Giant Swallowtail	*Papilio cresphontes*					X		X	X									
Gold-banded Skipper	*Autochton cellus*		X	X					X	X								
Gray Comma	*Polygonia progne*			X		X		X										
Great Purple Hairstreak	*Atlides halesus*		X															
Harris' Checkerspot	*Chlosyne harrisii*					X		X		X								
Harvester	*Feniseca tarquinius*		X	X		X												
Henry's Elfin	*Callophrys henrici*		X		X				X									
Hessel's Hairstreak	*Callophrys hesseli*		X		X					X								
Hickory Hairstreak	*Satyrium caryaevorum*			X		X		X	X									
Hoary Elfin	*Callophrys polios*				X				X	X								
Leonard's Skipper	*Hesperia leonardus*		X	X	X	X			X									
Long Dash	*Polites mystic*			X		X		X		X								
Mitchell's Satyr	*Neonympha mitchellii mitchellii*					X			X		X							
Monarch	*Danaus plexippus*	X	X	X	X	X		X	X	X								
Mottled Duskywing	*Erynnis martialis*			X		X		X	X									
Mustard (Eastern Veined) White	*Pieris oleracea*					X				X								
Northern Metalmark	*Calephelis borealis*					X		X	X	X								
Northern Oak Hairstreak	*Satyrium favonius ontario*					X		X		X								
Pepper and Salt Skipper	*Amblyscirtes hegon*					X		X	X	X								
Persius Duskywing	*Erynnis persius*			X	X	X		X	X									
Rare Skipper	*Problema bulenta*	X	X		X			X		X								
Regal Fritillary	*Speyeria idalia*			X		X		X		X								
Silver-bordered Fritillary	*Boloria selene myrina*		X	X	X	X		X	X	X								
Silvery Checkerspot	*Chlosyne nycteis*					X		X	X	X								
Sleepy Dusky Wing	*Erynnis brizo*		X	X	X	X		X	X									
Two-spotted Skipper	*Euphyes bimacula*				X			X		X								
West Virginia White	*Pieris virginiensis*			X		X												
White M Hairstreak	*Parrhasius m-album*		X	X	X	X		X	X									
Fairy Shrimp																		
Eastern Fairy Shrimp	*Eubranchipus holmanii*										X							
Moths																		
Aster Flower Moth	*Schinia septentrionalis*				X			X	X									
Barrens Dagger Moth	*Acronicta albarufa*		X		X			X		X								
Bird Dropping Moth	*Cerma cora*				X	X			X									
Boreal Fan Moth	*Brachionycha borealis*					X												
Broad-lined Erastra	*Erastria coloraria*		X	X	X	X		X	X									
Buchholz's Dart Moth	*Agrotis buchholzi*				X			X		X	X							
Buchholz's Gray	*Hypomecis buchholzaria*		X		X			X		X								
Carter's Noctuid Moth	*Spartiniphaga carterae*				X			X	X	X	X							
Chain Fern Borer Moth	*Papaipema stenocelis*		X		X					X	X							
Coastal Bog Metarranthis	*Metarranthis pilosaria*		X		X				X	X	X							
Columbine Borer	*Papaipema leucostigma*					X												
Consort Underwing	*Catocala consors*		X	X	X													
Culvers Root Borer Moth	*Papaipema sciata*					X		X		X								

(SGCN, their distribution and associated habitats continued)

Species of Greatest Conservation Need		Landscape Region						Habitat Association										
Common Name	**Scientific Name**	**Atlantic Coast**	**Delaware Bay**	**Piedmont Inner Coastal Plain**	**Pinelands**	**Skylands**	**Marine**	**Forest**	**Grassland**	**Shrub**	**Wetlands**	**Beach and Dune**	**Barren and Exposed Rock**	**Tidal Mudflat**	**Coldwater Stream**	**Warmwater Stream**	**Marine Near Shore Zone**	**Marine Off Shore Zone**
Daecke's Pyralid Moth	*Crambus daeckellus*				X			X	X	X	X							
Dark Stoneroot Borer Moth	*Papaipema duplicata*			X		X												
Doll's Merolonche	*Acronicta dolli*				X	X			X									
False Foxglove Seed Caterpillar	*Pyrrhia aurantiago*		X		X				X									
Golden Borer Moth	*Papaipema cerina*					X		X	X									
Graceful Clearwing	*Hemaris gracilis*		X	X	X			X	X	X								
Granitosa Fern Moth	*Callopistria granitosa*		X		X						X							
Hop Borer Moth	*Papaipema circumlucens*		X	X	X	X				X								
Lemmer's Noctuid Moth	*Lithophane lemmeri*		X		X					X								
Lizard Tail Borer	*Parapamea buffaloensis*					X				X								
Marbled Underwing	*Catocala marmorata*		X	X	X			X			X							
Maritime Sunflower Borer Moth	*Papaipema maritima*	X	X	X	X				X	X		X						
Pine Barrens Speranza	*Speranza exonerata*		X		X				X									
Pink Sallow	*Psectraglaea carnosa*		X	X	X			X		X	X							
Pink Streak	*Faronta rubripennis*		X		X				X	X								
Pitcher Plant Borer Moth	*Papaipema appassionata*				X	X		X		X	X							
Placentia Tiger Moth	*Grammia placentia*				X			X	X									
Plain Schizura	*Schizura apicalis*				X			X	X									
Precious Underwing	*Catocala pretiosa pretiosa*		X		X			X		X	X							
Sand Myrtle Looper/Pink	*Cyclophora culicaria*				X			X	X	X	X							
Schweitzer's Buckmoth	*Hemileuca sp. 2*					X			X		X							
Southern Ptichodis	*Ptichodis bistrigata*				X			X	X	X								
Stoneroot Flower Moth	*Psectrotarsia hebardi*					X												
Sunflower Borer Moth	*Papaipema necopina*			X		X												
Turtlehead Borer	*Papaipema nepheleptena*					X		X	X	X								
Umbellifer Borer	*Papaipema birdi*					X												
Underwing	*Catocala herodias gerhardi*				X				X									
Unnamed borer moth	*Papaipema eupatorii*					X		X	X	X								
Unnamed borer moth	*Papaipema harrisii*					X		X	X	X	X							
Unnamed borer moth	*Papaipema lysimachiae*					X		X	X	X								
Unnamed borer moth	*Papaipema nelita*					X		X	X	X								
Unnamed borer moth	*Papaipema pterisii*				X	X			X									
Unnamed borer moth	*Papaipema rigida*					X		X	X									
Unnamed borer moth	*Papaipema unimoda*					X		X		X								
Unnamed geometer moth	*Apodrepanulatrix liberaria*			X		X		X	X									
Unnamed geometrid moth	*Lytrosis sinuosa*				X													
Unnamed geometrid moth	*Metarranthis lateritiaria*		X		X				X	X								
Unnamed hand-maid moth	*Datana ranaeceps*				X				X									
Unnamed moth	*Dichagyris reliqua*				X			X	X	X								
Unnamed noctuid moth	*Lithophane lepida*				X				X									
Unnamed notodontid moth	*Heterocampa varia*		X		X			X		X								
Yellow Edged Pygarctia	*Pygarctia abdominalis*				X			X	X									
Yellow Stoneroot Borer Moth	*Papaipema astuta*					X		X										
Mussels																		
Brook Floater	*Alasmidonta varicosa*			X		X									X	X		
Creeper	*Strophitus undulatus*			X		X									X	X		
Dwarf Wedgemussel	*Alasmidonta heterodon*					X									X	X		
Eastern Lampmussel	*Lampsilis radiata*			X		X									X	X		
Eastern Pondmussel	*Ligumia nasuta*		X	X												X		
Green Floater	*Lasmigona subviridis*			X		X									X	X		
Tidewater Mucket	*Leptodea ochracea*		X	X												X		

(SGCN, their distribution and associated habitats continued)

Species of Greatest Conservation Need		Landscape Region						Habitat Association									
Common Name	**Scientific Name**	**Atlantic Coast**	**Delaware Bay**	**Piedmont Inner Coastal Plain**	**Pinelands**	**Skylands**	**Marine**	**Forest**	**Grassland**	**Shrub**	**Wetlands**	**Beach and Dune**	**Barren and Exposed Rock**	**Tidal Mudflat**	**Coldwater Stream**	**Warmwater Stream**	**Marine Near Shore Zone**	**Marine Off Shore Zone**
Triangle Floater	*Alasmidonta undulata*		X	X	X	X									X	X		
Yellow Lampmussel	*Lampsilis cariosa*			X		X									X	X		
Odonates																		
Allegheny River Cruiser	*Macromia alleghaniensis*		X		X						X				X			
Amber-winged Spreadwing	*Lestes eurinus*		X		X	X					X				X	X		
Arrowhead Spiketail	*Cordulegaster obliqua*					X					X				X			
Atlantic Bluet	*Enallagma doubledayi*		X		X						X					X		
Banner Clubtail	*Gomphus apomyius*		X		X					X				X	X			
Beaverpond Clubtail	*Gomphus borealis*					X					X					X		
Brook Snaketail	*Ophiogomphus aspersus*					X			X	X	X				X			
Brush-tipped Emerald	*Somatochlora walshii*					X					X					X		
Cobra Clubtail	*Gomphus vastus*					X					X				X			
Coppery Emerald	*Somatochlora georgiana*				X						X					X		
Crimson-ringed Whiteface	*Leucorrhinia glacialis*					X					X					X		
Delta-spotted Spiketail	*Cordulegaster diastatops*		X	X	X	X					X				X			
Elfin Skimmer	*Nannothemis bella*		X	X	X	X					X					X		
Extra-striped Snaketail	*Ophiogomphus anomalus*					X					X				X			
Forcipate Emerald	*Somatochlora forcipata*					X					X				X	X		
Golden-winged Skimmer	*Libellula auripennis*				X	X					X					X		
Gray Petaltail	*Tachopteryx thoreyi*			X		X				X				X				
Green-faced Clubtail	*Gomphus viridifrons*					X					X				X			
Green-striped Darner	*Aeshna verticalis*			X		X					X					X		
Harpoon Clubtail	*Gomphus descriptus*					X					X				X			
Hudsonian Whiteface	*Leucorrhinia hudsonica*					X					X					X		
Kennedy's Emerald	*Somatochlora kennedyi*					X					X				X	X		
Lilypad Clubtail	*Arigomphus furcifer*					X					X					X		
Little Blue Dragonlet	*Erythrodiplax minuscula*				X					X					X			
Little Bluet	*Enallagma minusculum*		X		X					X					X			
Maine Snaketail	*Ophiogomphus mainensis*				X	X					X				X			
Martha's Pennant	*Celithemis martha*				X	X					X					X		
Midland Clubtail	*Gomphus fraternus*					X					X				X			
Mottled Darner	*Aeshna clepsydra*		X	X	X	X					X					X		
New England Bluet	*Enallagma laterale*					X					X					X		
Ocellated Darner	*Boyeria grafiana*					X					X				X			
Pine Barrens Bluet	*Enallagma recurvatum*		X		X						X					X		
Rapids Clubtail	*Gomphus quadricolor*			X		X					X				X			
Riffle Snaketail	*Ophiogomphus carolus*					X					X				X			
Robust Baskettail	*Epitheca spinosa*		X	X	X			X	X	X	X				X			
Sable Clubtail	*Gomphus rogersi*					X					X				X	X		
Scarlet Bluet	*Enallagma pictum*				X						X							
Seaside Dragonlet	*Erythrodiplax berenice*		X	X	X					X					X			
Septima's Clubtail	*Gomphus septima*					X		X			X				X			
Ski-tailed Emerald	*Somatochlora elongata*					X					X				X	X		
Southern Pygmy Clubtail	*Lanthus vernalis*					X					X				X	X		
Sparkling Jewelwing	*Calopteryx dimidiata*		X		X						X				X			
Spatterdock Darner	*Rhionaeschna mutata*					X					X					X		
Spine-crowned Clubtail	*Gomphus abbreviatus*					X					X				X			
Subarctic Darner	*Aeshna subarctica*					X					X					X		
Superb Jewelwing	*Calopteryx amata*					X		X			X				X			
Taper-tailed Darner	*Gomphaeschna antilope*		X		X						X					X		
Tiger Spiketail	*Cordulegaster erronea*			X		X					X				X			

(SGCN, their distribution and associated habitats continued)

Species of Greatest Conservation Need		Landscape Region						Habitat Association										
Common Name	**Scientific Name**	**Atlantic Coast**	**Delaware Bay**	**Piedmont Inner Coastal Plain**	**Pinelands**	**Skylands**	**Marine**	**Forest**	**Grassland**	**Shrub**	**Wetlands**	**Beach and Dune**	**Barren and Exposed Rock**	**Tidal Mudflat**	**Coldwater Stream**	**Warmwater Stream**	**Marine Near Shore Zone**	**Marine Off Shore Zone**
Uhler's Sundragon	*Helocordulia uhleri*		X	X	X	X					X				X			
Umber Shadowdragon	*Neurocordulia obsoleta*			X		X					X				X	X		
Williamson's Emerald	*Somatochlora williamsoni*					X					X				X	X		
Zebra Clubtail	*Stylurus scudderi*					X					X				X			
Tiger Beetles																		
American Burying Beetle	*Nicrophorus americanus*			X	X	X			X									
Appalachian Tiger Beetle	*Cicindela ancocisconensis*					X												
Beach-dune Tiger Beetle	*Cicindela hirticollis*	X									X							
Cobblestone Tiger Beetle	*Cicindela marginipennis*					X					X							
Common Claybank Tiger Beetle	*Cicindela limbalis*					X		X	X									
Little White Tiger Beetle	*Cicindela lepida*	X	X		X			X	X	X		X						
Margined Tiger Beetle	*Cicindela marginata*	X									X	X		X				
New Jersey Pine Barrens Tiger Beetle	*Cicindela patruela consentanea*				X			X	X	X								
Northeastern Beach Tiger Beetle	*Cicindela dorsalis dorsalis*	X	X									X						
Southeastern Beach Tiger Beetle	*Cicindela dorsalis media*	X	X									X						
Unnamed tiger beetle	*Cicindela patruela*					X		X										

This page intentionally left blank

NJ State Wildlife Action Plan, 2017

Profiles of the Focal Species of Greatest Conservation Need

NJ Department of Environmental Protection
Division of Fish and Wildlife
March 27, 2018

NEW JERSEY DIVISION OF
Fish and Wildlife

Table of Contents

Page

Introduction D-1
Understanding the Focal SGCN Profiles D-1

Species

Mammals D-2
- Allegheny Woodrat D-2
- Indiana Bat D-4
- Little Brown Bat D-7
- North Atlantic Right Whale D-9
- Northern Myotis D-11

Birds D-13
- American Oystercatcher D-13
- American Woodcock D-15
- Black Rail D-17
- Black Skimmer D-19
- Blue-winged Warbler D-21
- Bobolink D-23
- Cerulean Warbler D-25
- Common Tern D-27
- Eastern Meadowlark D-29
- Forster's Tern D-31
- Golden-winged Warbler D-33
- Grasshopper Sparrow D-36
- Kentucky Warbler D-38
- Least Tern D-40
- Little Blue Heron D-42
- Northern Bobwhite D-44
- Northern Harrier D-46
- Peregrine Falcon D-48
- Pied-billed Grebe D-50
- Piping Plover D-52
- Prothonotary Warbler D-54
- Red Knot D-56
- Red-headed Woodpecker D-58
- Ruddy Turnstone D-61
- Scarlet Tanager D-63
- Snowy Egret D-65

Tricolored Heron D-67
Vesper Sparrow D-69
Wood Thrush D-71

Reptiles and Amphibians D-73
Atlantic Green Turtle D-73
Atlantic Leatherback D-75
Atlantic Loggerhead D-77
Atlantic Ridley D-79
Bog Turtle D-81
Carpenter Frog D-83
Corn Snake D-85
Eastern Box Turtle D-87
Eastern Hognose Snake D-89
Eastern Redbelly Turtle D-91
Eastern Spadefoot D-93
Eastern Tiger Salamander D-95
Longtail Salamander D-98
NJ Chorus Frog D-100
Northern Black Racer D-102
Northern Diamondback Terrapin D-104
Northern Pine Snake D-106
Northern Red Salamander D-108
Northern Scarlet Snake D-110
Pine Barrens Treefrog D-112
Timber Rattlesnake D-114
Wood Turtle D-116

Fish D-118
Alewife D-118
Atlantic Sturgeon D-120
Banded Sunfish D-122
Blackbanded Sunfish D-124
Blueback Herring D-126
Bridle Shiner D-128
Brook Trout D-130
Comely Shiner D-132
Ironcolor Shiner D-134
Mud Sunfish D-136
Shortnose Sturgeon D-138
Swamp Darter D-140

Macroinvertebrates D-142
A. Notodontid Moth (H. Varia) D-142
American Bumble Bee D-144
Arogos Skipper D-146
Ashton Cuckoo Bumble Bee D-148
Brook Floater D-150
Buchholz's Dart Moth D-152
Buchholz's Gray D-154
Carter's Noctuid Moth D-156
Daecke's Pyralid Moth D-158
Dotted Skipper D-160
Dwarf Wedgemussel D-162
Eastern Lampmussel D-164
Frosted Elfin D-166
Georgia Satyr D-168
Green Floater D-170
Hoary Elfin D-172
Leonard's Skipper D-174
Little White Tiger Beetle D-176
Maritime Sunflower Borer Moth D-178
New England Bluet D-180
New Jersey Pine Barrens Tiger Beetle D-182
Northeastern Beach Tiger Beetle D-184
Northern Metalmark D-186
Papaipema harrisii D-188
Pine Barrens Bluet D-190
Pink Sallow D-192
Robust Baskettail D-194
Rusty Patched Bumble Bee D-196
Sand Myrtle Looper/Pink D-198
Scarlet Bluet D-200
Septima's Clubtail D-202
Southeastern Beach Tiger Beetle D-204
Southern Plains Bumble Bee D-206
Superb Jewelwing D-208
Triangle Floater D-210
Variable Cuckoo Bumble Bee D-212
Yellow Bumble Bee D-214
Yellow Lampmussel D-216
Yellow-banded Bumble Bee D-218

Introduction

New Jersey's State Wildlife Action Plan (SWAP) includes 656 species of greatest conservation need (SGCN). Recognizing that this list was too large for an effective plan with achievable goals, the SWAP executive committee (a group consisting primarily of conservation partners) and the state Division of Fish & Wildlife (DFW) identified a subset of these species called Focal SGCN. The 107 Focal SGCN are state and regional priorities and represent broad taxonomic groups, habitat types, and landscapes across New Jersey. There is also capacity in the state to positively affect their long-term persistence. Focal SGCN were selected through an assessment process that considered state and regional imperilment, the importance of New Jersey populations to each species' range-wide viability, and the feasibility that conservation actions would benefit the species. The process of filtering the full SGCN list to the 107 Focal SGCN is described more fully in Chapter 1 of this State Wildlife Action Plan.

Concentrating on Focal SGCN will help focus planning and conservation efforts to achieve results for the Focal SGCN ***and*** for the many other SGCN not formally addressed within the plan. This approach is not meant to suggest or imply that the state's conservation interests are limited to the 107 Focal SGCN.

Recognizing that synergies exist between species with overlapping habitats, the 107 Focal SGCN were grouped by the expert taxonomic teams into guilds that reflected similarities in the species' taxonomies, ecological requirements, threats, and actions needed to conserve them. This assessment categorized 77 of the species into 18 groupings, while the remaining 30 species remained ungrouped.

Understanding the Focal SGCN Profiles

The following pages include summary profiles of each Focal SGCN. These profiles include:

- General information on appearance, life history requirements, and geographic distribution within New Jersey.
- State Wildlife Action Plan categorization of taxonomic and guild type, and conservation targets.
- Conservation status at the federal, regional, and state levels (including breeding versus nonbreeding for birds), and their ranks within the NatureServe international database.
- Status of the species' population abundance and trend.
- Broad habitat categories (descriptions of these are provided in Chapter 1 of this plan).
- Landscape Region(s) where the species occurs in New Jersey.
- A statement indicating whether species habitat mapping is available through the New Jersey Landscape Project maps (details on the Landscape Project map are provided in Attachment II).
- References to additional information on abundance and population trends, as well as other conservation plans that might be available.

Mammals

Allegheny Woodrat

Neotoma magister

The Allegheny Woodrat is a medium-size rodent that superficially resembles the introduced Norway Rat, although the woodrat has a bicolor, furred tail, larger ears, eyes, and head, and longer whiskers. They typically occur in rocky areas associated with mountain ridges such as cliffs, caves, talus slopes and rocky fissures and the presence of mast-producing trees nearby are important. Allegheny Woodrat populations were once present from Connecticut, west to Indiana, and south to Alabama, but they have been experiencing significant declines in the past 30 years. They are now extirpated from Connecticut and New York and since 1984 New Jersey has had just one population remaining. The population decline is likely the result of a variety of interacting factors: chestnut blight, gypsy moth infestations, raccoon roundworm, and land cover change.

SWAP Classification

Broad Group: Terrestrial Wildlife
Taxon: Mammals
Taxa Sub Group: Terrestrial Mammals
Species Group:
Guild Group:
Conservation Target: Allegheny Woodrat

Conservation Status

State: E
S_Rank: S1
Federal:
G_Rank: G3G4

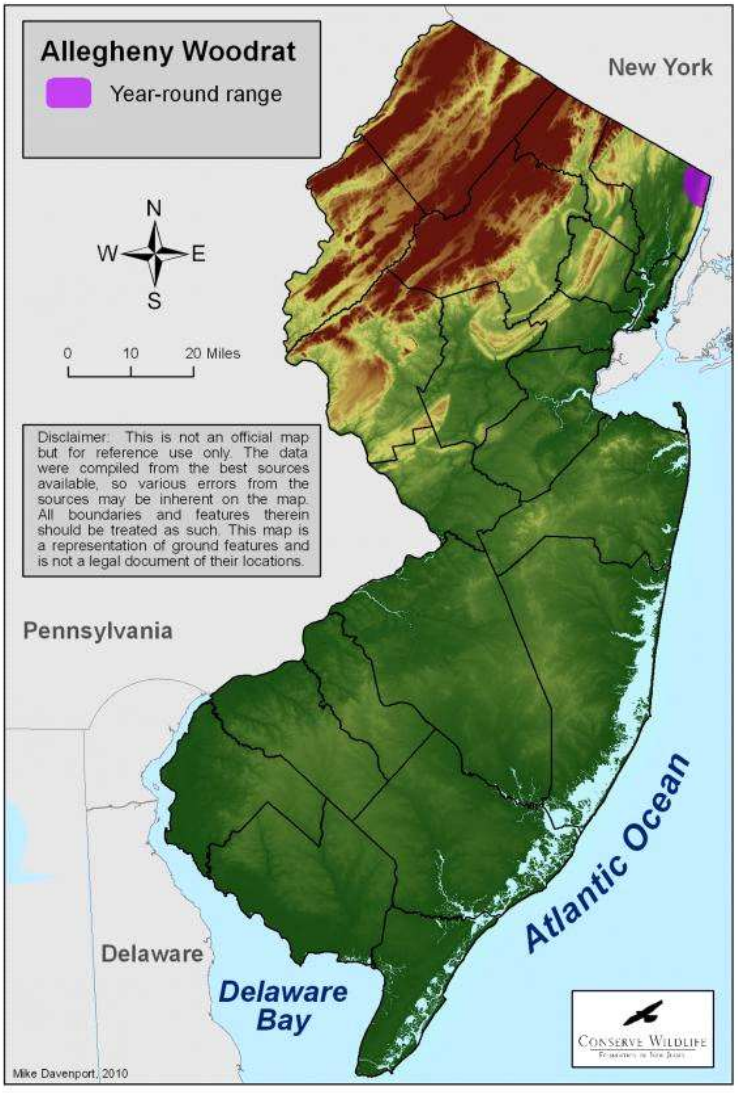
Population Status

Abundance: Extremely Rare
Trend: Stable

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Barren and Exposed Rock	X
Forest	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
			x		

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Fowles, G. 2016. Allegheny Woodrat Conservation. Federal Aid in Wildlife Restoration Report W-71-R-1. New Jersey Dept. of Environmental Protection, Division of Fish and Wildlife, Endangered and Nongame Species Program. Trenton, N.J.	☑	☑	☐
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☑	☐

Indiana Bat

Myotis sodalis

The Indiana Bat is one of four NJ bat species belonging to the Myotis genus. It is about 3.5 inches in body length with a 10 inch wingspan and is distinguished by its grayish lackluster fur, short, sparse toe hairs, and other subtle physical traits. In summer, Indiana Bats inhabit forests - particularly wooded wetlands and riparian areas - where they roost by day beneath loose tree bark. At night they navigate using echolocation to feed on insects like moths, beetles, flies, and mosquitoes. Adult females form maternity colonies of up to 100 individuals, and each female raises just one pup per year. Indiana Bats spend the winter hibernating below ground in caves and mines that meet their highly selective preferences for temperature and humidity. They are known to use just two hibernacula in NJ; both are abandoned iron mines. Since 2006, a fungal disease called White-nose Syndrome has spread across North America, bringing devastation to bats as they hibernate. An estimated 40,000 Indiana Bats have died from the disease range-wide. Absent WNS, their lifespan approaches 20 years.

SWAP Classification

Broad Group: Terrestrial Wildlife
Taxon: Mammals
Taxa Sub Group: Terrestrial Mammals
Species Group:
Guild Group: Cave-hibernating Bats
Conservation Target: Cave-hibernating Bats

Conservation Status

State: E
S_Rank: S1
Federal:
G_Rank: G2

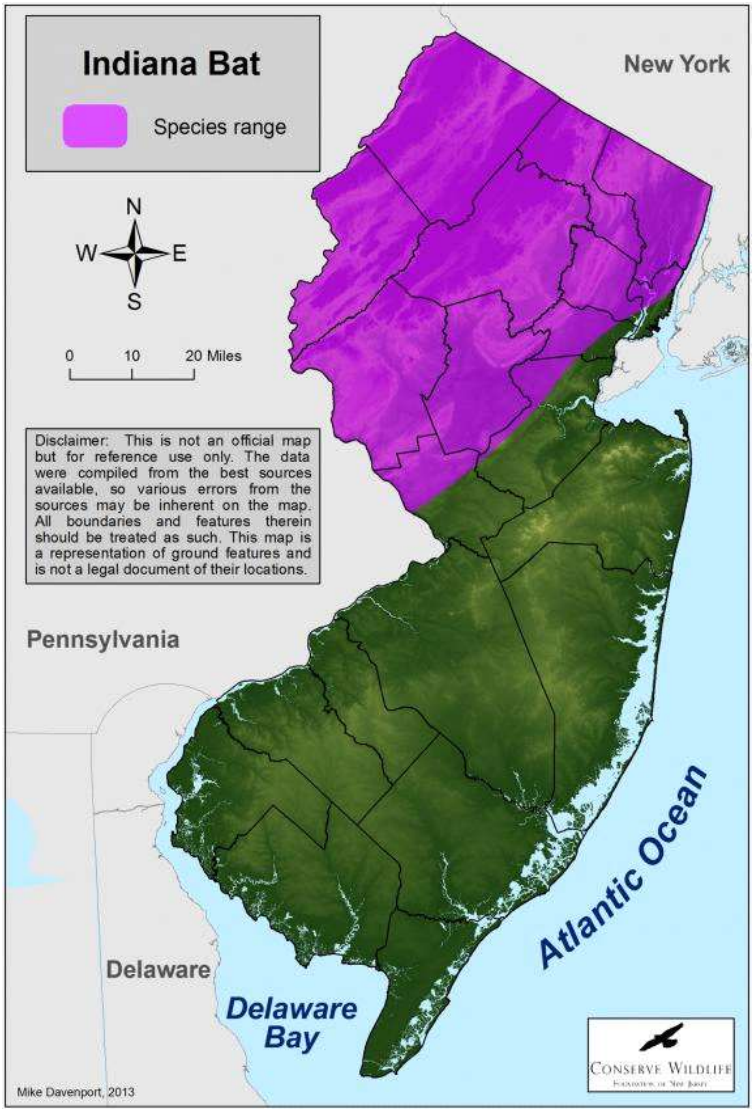
Population Status

Abundance: Extremely Rare
Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Forest	X
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
			x		x

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
U.S. Fish and Wildlife Service. 2011. A national plan for assisting states, federal agencies, and tribes in managing white-nose syndrome in bats. USFWS, Hadley, M.A. 21 pp. Available from https://www.whitenosesyndrome.org/sites/default/files/white-nose_syndrome_national_plan_may_2011_0.pdf	☐	☐	☑
U.S. Fish and Wildlife Service. 2015. Population estimates for the Indiana bat (Myotis sodalis) by USFWS Region. U.S. Fish & Wildlife Service, Minneapolis, M.N. Available from http://www.fws.gov/MIDWEST/endangered/mammals/inba/pdf/2015IBatPopEstimate25Aug2015v2.pdf (accessed January 2016).	☑	☑	☐
Hall, M. 2015. Species of Greatest Conservation Need: Mammal research and management. Report NJ W-71-R-1. New Jersey Dept. of Environmental Protection, Division of Fish and Wildlife, Endangered and Nongame Species Program. Trenton, N.J.	☐	☑	☐
U.S. Fish and Wildlife Service. 2007. Indiana Bat (Myotis sodalis) Draft Recovery Plan: First Revision. USFWS, Fort Snelling, M.N. 258pp. Available from https://www.fws.gov/MIDWEST/endangered/mammals/inba/pdf/inba_fnldrftrecpln_apr07.pdf	☐	☐	☑
U.S. Fish and Wildlife Service. 2009. Indiana bat (Myotis sodalis) 5-year review: Summary and evaluation. USFWS, Bloomington, I.N. Available from https://www.fws.gov/midwest/Endangered/recovery/5yr_rev/pdf/INBA5Yr30Sept2009.pdf	☐	☐	☑
Bohrman, J., and D.M. Fecske. 2013. White-nose syndrome surveillance and summer monitoring of bats at Great Swamp National Wildlife Refuge, Morris County, N.J. Final Report. U.S. Fish and Wildlife Service Great Swamp National Wildlife Refuge, Basking Ridge, N.J.	☑	☐	☐

Sanders, C. 2015. Report on Indiana bat (Myotis sodalis) sampling at the Mount Hope Mine Shaft West, Morris County, N.J. Report. Sanders Environmental Inc. Bellefonte, P.A. ☑ ☑ ☐

Little Brown Bat

Myotis lucifugus

The Little Brown Bat is one of the most widespread and familiar bats of North America, thanks to its adaptable and colonial nature. It is one of four NJ bat species belonging to the Myotis genus. Little Browns are about 3 inches in body length with a 9-10 inch wingspan and are distinguished by their glossy brown fur, long toe hairs, and other subtle physical traits. In spring and summer, Little Browns live in forests all across NJ and spend the day roosting in tree crevices, beneath loose bark, or in buildings. At night they navigate by echolocation to feed on insects. Maternity colonies can number in the hundreds or even the thousands, with each mother bat raising just one pup per year. Little Brown Bats spend the winter hibernating below ground in caves and mines. Since 2006, a fungal disease called White-nose Syndrome (WNS) has spread across North America, bringing devastation to bats as they hibernate. The mortality rate for Little Brown Bats is nearly 100%. Absent WNS, Little Browns are champions of longevity with a lifespan approaching 30 years.

SWAP Classification

Broad Group: Terrestrial Wildlife
Taxon: Mammals
Taxa Sub Group: Terrestrial Mammals
Species Group:
Guild Group: Cave-hibernating Bats
Conservation Target: Cave-hibernating Bats

Conservation Status

State:
S_Rank: S1
Federal:
G_Rank: G3

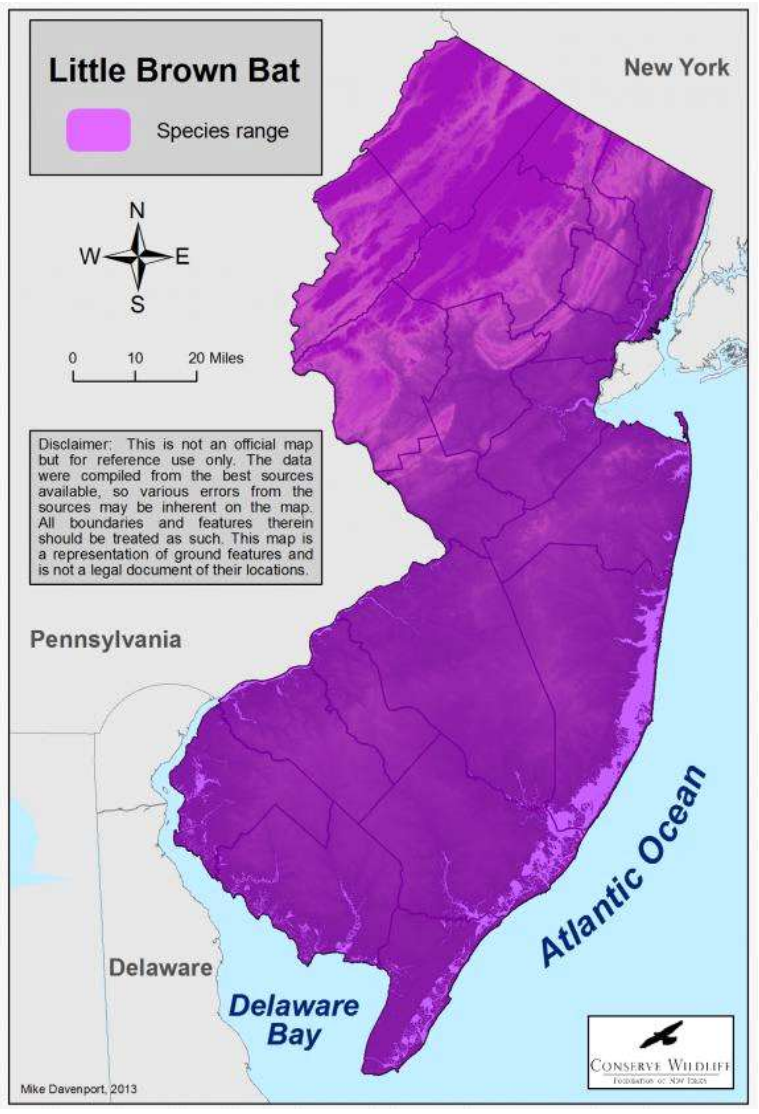
Population Status

Abundance: Rare
Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Forest	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
	x	x	x	x	x

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Frick, W.F., J.F. Pollock, A.C. Hicks, K.E. Langwig, D.S. Reynolds, G.G. Turner, C.M. Butchkoski, and T.H. Kunz. 2010. An emerging disease causes regional population collapse of a common North American bat species. Science 329:679-682.	☐	☑	☐
Valent, M. 2012. White nose syndrome investigation and response. Final Report NJ U2-1-R-1. New Jersey Dept. of Environmental Protection, Division of Fish and Wildlife, Endangered and Nongame Species Program. Trenton, N.J.	☑	☐	☐
Hall, M. 2015. Species of Greatest Conservation Need: Mammal research and management. Report NJ W-71-R-1. New Jersey Dept. of Environmental Protection, Division of Fish and Wildlife, Endangered and Nongame Species Program. Trenton, N.J.	☑	☑	☐
U.S. Fish and Wildlife Service. 2011. A national plan for assisting states, federal agencies, and tribes in managing white-nose syndrome in bats. USFWS, Hadley, M.A. 21 pp. Available from https://www.whitenosesyndrome.org/sites/default/files/white-nose_syndrome_national_plan_may_2011_0.pdf	☐	☐	☑
Sanders, C. 2015. Report on Indiana bat (Myotis sodalis) sampling at the Mount Hope Mine Shaft West, Morris County, N.J. Report. Sanders Environmental Inc. Bellefonte, P.A.	☑	☐	☐
Maslo, B., M. Valent, J.F. Gumbs, and W.F. Frick. 2015. Conservation implications of amerliorating survival of little brown bats with white-nose syndrome. Ecological Applications 25(7):1832-1840.	☐	☑	☐

North Atlantic Right Whale

Eubalaena glacialis

The North Atlantic Right Whale is both a Federal and State Endangered species, and is among the most critically endangered large whales in the world. It is primarily a coastal species and is not typically encountered far offshore or in very deep water. Right Whales use NJ waters as a migratory pathway between summer feeding and winter breeding grounds. Feeding behavior has been documented along the NJ coast, with individuals observed very close to the shoreline. Threats to Right Whales include collisions with ships, entanglement in fishing gear, habitat degradation, oil spills, climate and ecosystem changes, disturbance from whale watching activities, and noise from industrial activities.

SWAP Classification

Broad Group: Marine Wildlife

Taxon: Mammals

Taxa Sub Group: Marine Mammals

Species Group:

Guild Group: Baleen Whales

Conservation Target: North Atlantic Right Whale

Conservation Status

State: E

S_Rank: S1

Federal:

G_Rank: G1

Population Status

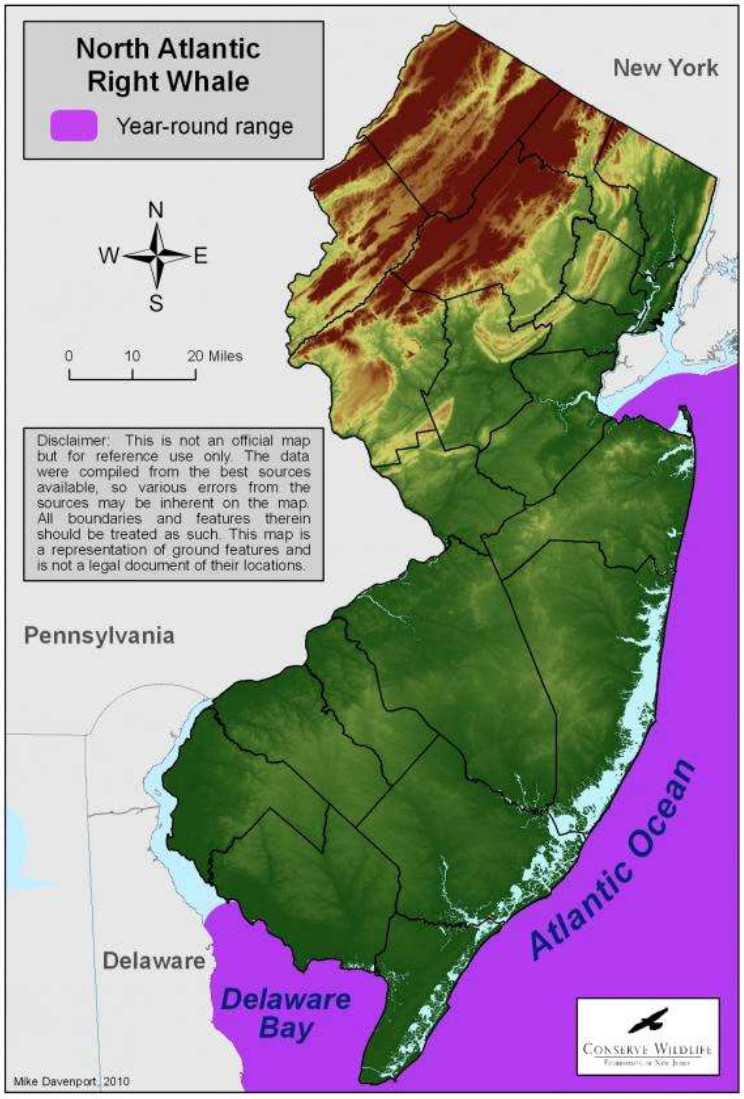
Abundance: Extremely Rare

Trend: Increasing

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Marine Nearshore Zone	X
Marine Offshore Zone	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
x					

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
National Marine Fisheries Service. 2005. Recovery Plan for the North Atlantic Right Whale (Eubalena glacialis). NMFS. Silver Spring, M.D. Available from http://www.nmfs.noaa.gov/pr/pdfs/recovery/whale_right_northatlantic.pdf (accessed January 2016).	☐	☐	☑
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☑	☐
National Marine Fisheries Service. 2016. North Atlantic Right Whale. NOAA Office of Protected Resources, Silver Spring, MD. Available from http://www.nmfs.noaa.gov/pr/species/mammals/whales/north-atlantic-right-whale.html (accessed January 2016).	☑	☑	☐
Northeast Fisheries Science Center. 2015. North Atlantic Right Whale (Eubalaena glacialis) Western Stock Assessment. NOAA. Available from http://nefsc.noaa.gov/publications/tm/tm231/7_rightwhale_F2014July.pdf (accessed January 2016).	☑	☑	☐

Northern Myotis

Myotis septentrionalis

The Northern Myotis (a.k.a. Northern Long-eared Bat) is one of four NJ bat species belonging to the Myotis genus. Each is about 3 inches in body length with a 9-10 inch wingspan. Subtle physical differences set the Northern Myotis apart, including its longer ears (17-19 mm long), dagger-like tragus, and yellowish-hued fur. This bat is an agile flier and prefers dense forest habitats in summer. At night it navigates using echolocation to feed on small insects like caddisflies, moths, and beetles. It roosts by day beneath loose tree bark or in a wide array of tree cavities and crevices, occasionally making use of man-made structures as well. Adult females form small maternity colonies, and each mother bat raises just one pup per year. The Northern Myotis spends the winter hibernating below ground in caves and mines. Since 2006, a fungal disease called White-nose Syndrome (WNS) has spread across North America, bringing devastation to bats as they hibernate. The mortality rate for Northern Myotis is as high as 99%; as such, the species was listed as threatened under the Federal Endangered Species Act in April 2015. Absent WNS, this bat has a lifespan approaching 20 years.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Mammals

Taxa Sub Group: Terrestrial Mammals

Species Group:

Guild Group: Cave-hibernating Bats

Conservation Target: Cave-hibernating Bats

Conservation Status

State:

S_Rank: S1

Federal:

G_Rank: G1G3

Population Status

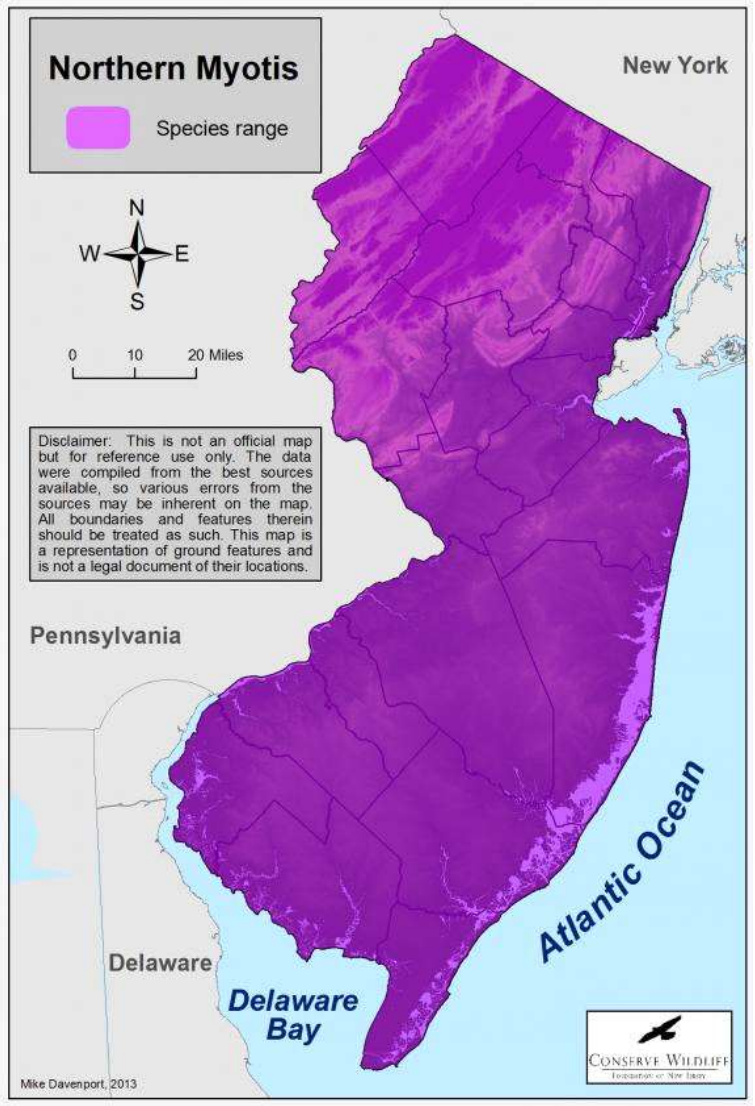
Abundance: Rare

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Forest	X
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
	x	x	x	x	x

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Conserve Wildlife Foundation of NJ. 2014. 2014 Mobile Acoustic Survey and Summer Bat Count results. Report. Conserve Wildlife Foundation of New Jersey. Trenton, N.J.	☑	☐	☐
U.S. Fish and Wildlife Service. 2011. A national plan for assisting states, federal agencies, and tribes in managing white-nose syndrome in bats. USFWS, Hadley, M.A. 21 pp. Available from https://www.whitenosesyndrome.org/sites/default/files/white-nose_syndrome_national_plan_may_2011_0.pdf	☐	☐	☑
Sanders, C. 2015. Report on Indiana bat (Myotis sodalis) sampling at the Mount Hope Mine Shaft West, Morris County, N.J. Report. Sanders Environmental Inc. Bellefonte, P.A.	☑	☐	☐
Francl, K.E., W.M. Ford, D.W. Sparks, and V. Brack Jr. 2012. Capture and reproductive trends in summer bat communities in West Virginia: Assessing the impact of white-nose syndrome. Journal of Fish and Wildlife Management 3(1):33–42.	☐	☑	☐
Risley, L.S. 2015. Bat monitoring in Area B and other, similar wetlands on the FAA Technical Center property. Report. William Paterson University. Wayne, N.J.	☐	☑	☐
Conserve Wildlife Foundation of NJ. 2015. Mist-netting and radio-telemetry study. Final Report. Conserve Wildlife Foundation of New Jersey. Trenton, N.J.	☑	☐	☐
Turner, G.G., D.M. Reeder, and J.T.H. Coleman. 2011. A five-year assessment of mortality and geographic spread of white-nose syndrome in North American bats and a look into the future. Bat Research News 52(2):13-27.	☐	☑	☐

Birds

American Oystercatcher

Haematopus palliatus

The American Oystercatcher is a medium sized shorebird with a distinctive long orange bill and bright yellow eyes. It breeds on the beaches and marshes of Atlantic coastal NJ. It lays its eggs directly on the sand or in the marsh in a more structured nest (using some vegetation) than other beach nesting birds, though it is still rather simple. The eponymous adults feed on bivalves like oysters, mussels and clams. The chicks are semi-precocial and mobile within a few hours of hatching but rely on adults to feed them. The chicks will shadow their parents, taking visual cues on how to forage. Like other coastal birds, human generated disturbance and sea level rise (coupled with a stabilized coast) are among their primary threats.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Birds

Taxa Sub Group: Waterbirds

Species Group:

Guild Group: Beach nesting Birds

Conservation Target: Beach nesting Birds

Conservation Status

State: SC/SC

S_Rank: S3B,S3N

Federal:

G_Rank: G5

Population Status

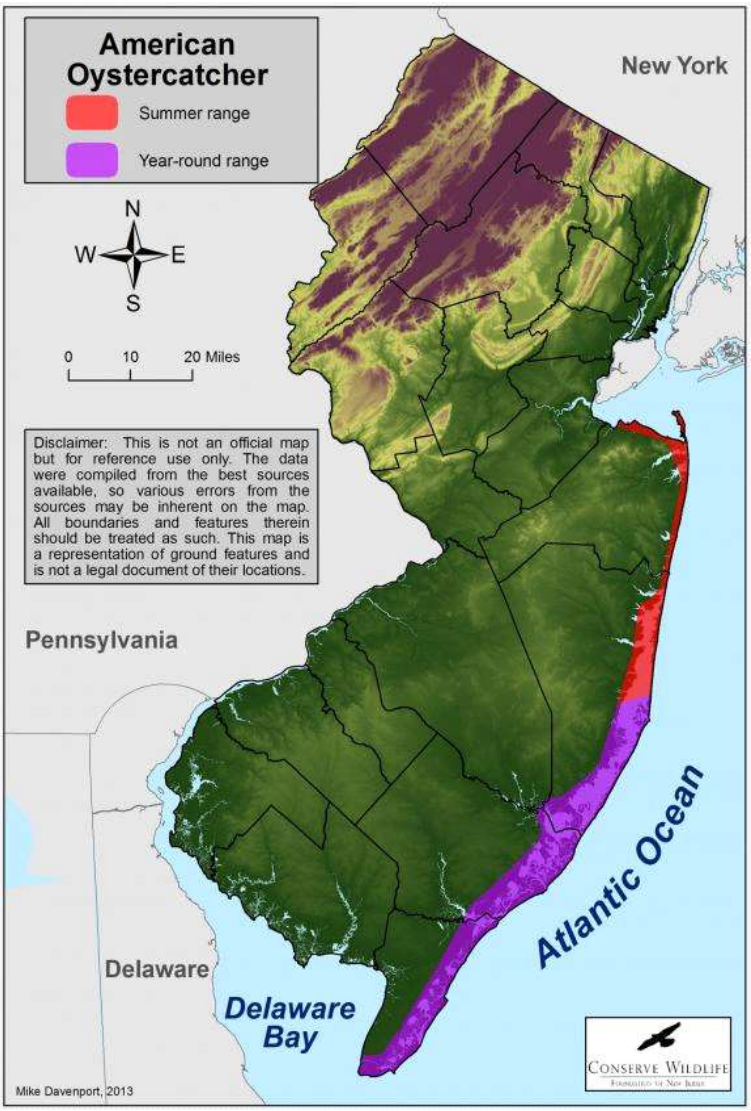
Abundance: Uncommon

Trend: Stable

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Beach and Dune	X
Tidal Mudflat	X
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
	x	x	x		

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☑	☐
Schulte, S., S. Brown, D. Reynolds, and the American Oystercatcher Working Group. 2010. Version 2.1. American Oystercatcher Conservation Action Plan for the United States Atlantic and Gulf Coasts. Available from http://www.conservewildlifenj.org/downloads/cwnj_310.pdf (accessed February 2016).	☑	☑	☑

American Woodcock

Scolopax minor

The American Woodcock is a short-legged shorebird that uses forests, wooded edges, wet meadows, and open fields for breeding, roosting, foraging, and/or courtship displays. It has a short neck and long straight bill, and is well-camouflaged against leaf litter on the forest floor. Like other shorebirds, the young are precocial and able to move and forage on their own shortly after hatching. Proper and targeted forested management can be beneficial for this species.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Birds

Taxa Sub Group: Landbirds

Species Group:

Guild Group: Young Forest Birds

Conservation Target: Young Forest Birds

Conservation Status

State:

S_Rank: S5

Federal:

G_Rank: G5

Population Status

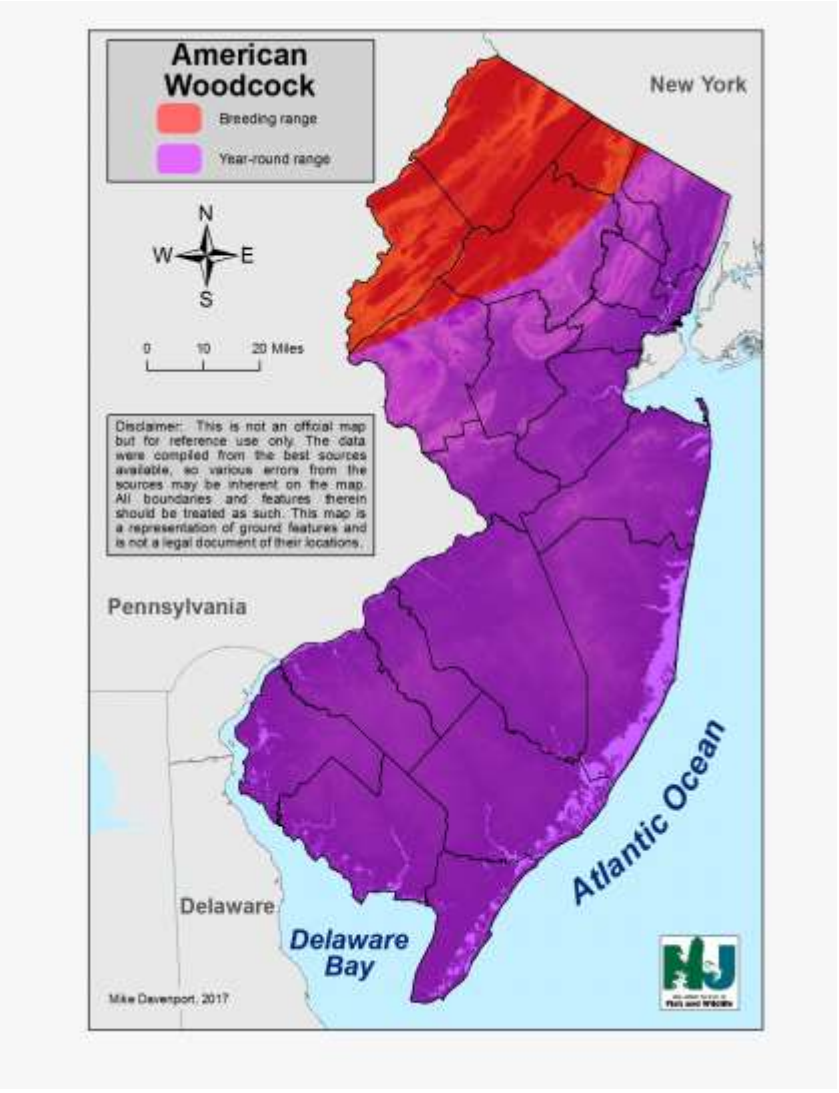
Abundance: Uncommon

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Forest	X
Shrub	X
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
	x	x	x	x	x

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Appalachian Mountains Joint Venture. 2015. Appalachian Mountains Joint Venture 3-year Operational Plan 2015-2018. Available from http://amjv.org/documents/AMJV_2015-18_operational_plan_Approved_June_2015.pdf (accessed February 2016).	☐	☐	☑
Clark, K.E., and L.J. Niles. 2000. Northern Atlantic Regional Shorebird Plan, Version 1.0. New Jersey Division of Fish and Wildlife, Woodbine, New Jersey. 29 pp. Available from http://www.shorebirdplan.org/wp-content/uploads/2013/01/NATLAN4.pdf (accessed February 2016).	☐	☐	☑
Sauer, J.R., J.E. Hines, J.E. Fallon, K.L. Pardieck, D.J. Ziolkowski, Jr., and W.A. Link. 2014. The North American Breeding Bird Survey, Results and Analysis 1966 - 2013. Version 01.30.2015. USGS Patuxent Wildlife Research Center. Laurel, M.D.	☐	☑	☐
Brown, S., C. Hickey, B. Harrington, and R. Gill, eds. 2001. The US Shorebird Conservation Plan, 2nd ed. Manomet Center for Conservation Sciences. Manomet, M.A. Available from http://www.shorebirdplan.org/wp-content/uploads/2013/01/USShorebirdPlan2Ed.pdf (accessed February 2016).	☐	☐	☑
Cooper, T.R., and R.D. Rau. 2015. American woodcock population status, 2015. U.S. Fish and Wildlife Service, Laurel, M.D. 16 pp.	☑	☑	☐

Black Rail

Laterallus jamaicensis

The Black Rail is a small, secretive bird that inhabits freshwater marshes in NJ. This diminutive species is difficult to study as it is hard to detect through traditional surveys. It lives in areas that are challenging to access and it remains hidden among grasses for most of its life. This bird builds a nest in the reeds, low to the ground. Susceptible to flooding and predation, if the nest hatches, the chicks leave the nest within one day and are fed by the adults. The species is declining throughout the mid-Atlantic, mainly due to the loss and conversion of high marsh habitat from development and sea-level rise.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Birds

Taxa Sub Group: Waterbirds

Species Group:

Guild Group: Marsh Birds

Conservation Target: Marsh Birds

Conservation Status

State: E/T

S_Rank: S1B,S2N

Federal:

G_Rank: G4

Population Status

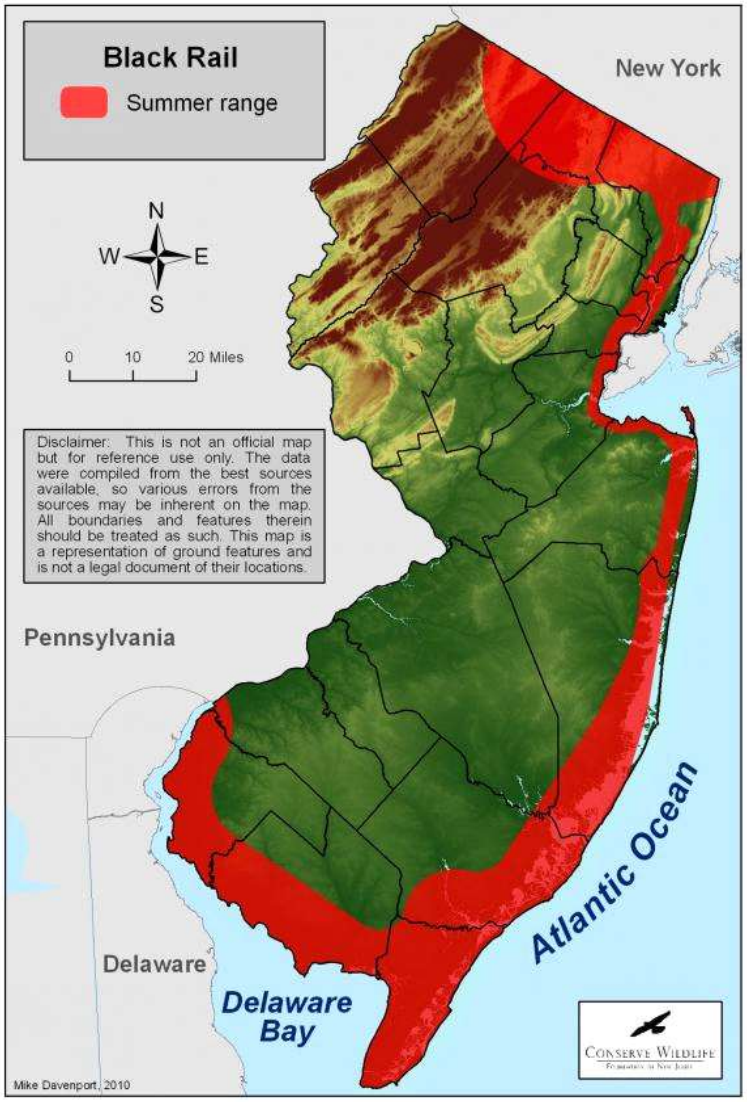
Abundance: Extremely Rare

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
	x	x			

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Davis, C. 2015. Black Rail Survey. Report NJ W-70-R-1. New Jersey Dept. of Environmental Protection, Division of Fish and Wildlife, Endangered and Nongame Species Program. Trenton, N.J.	☑	☑	☐
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☑	☐
Kushlan, J.A. et al. 2002. North American Waterbird Conservation Plan. Available from http://www.waterbirdconservation.org/nawcp.html (accessed February 2016).	☐	☐	☑

Black Skimmer

Rynchops niger

The Black Skimmer is a striking black and white medium sized shorebird with an orange bill that breeds on the beaches and marshes of the Atlantic Coast of NJ. It is the only bird in North America that has a longer lower than upper mandible, used to feed on fish, scooping them up as it skims the water with the lower jaw extended. Skimmer eggs are laid directly on the sand (beaches) or wrack (marsh) and the chicks are semi-precocial. The chicks are mobile but spend a large majority of their time roosting within the colony, waiting for adults to bring food for them. Like other coastal bird species, human generated disturbance and sea level rise (coupled with a stabilized coast) are among their primary threats.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Birds

Taxa Sub Group: Waterbirds

Species Group:

Guild Group: Beach nesting Birds

Conservation Target: Beach nesting Birds

Conservation Status

State: E

S_Rank: S1B,S1N

Federal:

G_Rank: G5

Population Status

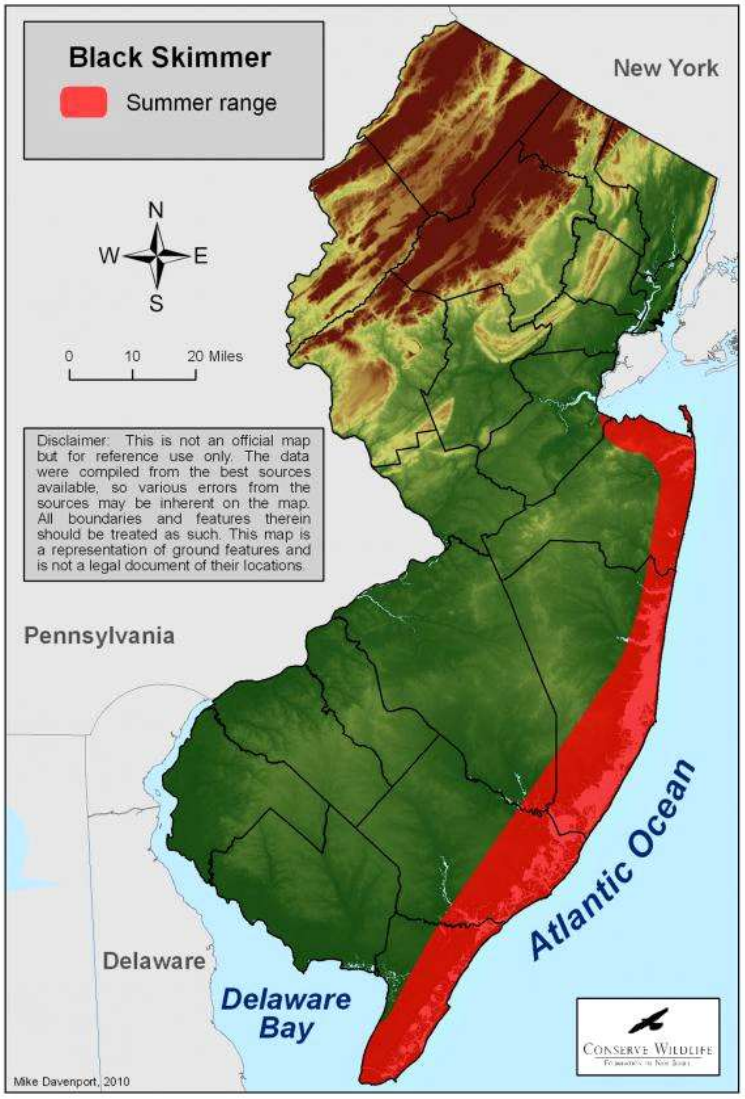
Abundance: Rare

Trend: Stable

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Beach and Dune	X
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
x	x	x	x		

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Kushlan, J.A. et al. 2002. North American Waterbird Conservation Plan. Available from http://www.waterbirdconservation.org/nawcp.html (accessed February 2016).	☐	☐	☑
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☑	☐
Davis, C. 2015. Beach nesting birds. Report NJ T-1-7. New Jersey Dept. of Environmental Protection, Division of Fish and Wildlife, Endangered and Nongame Species Program. Trenton, N.J.	☑	☑	☐

Blue-winged Warbler

Vermivora pinus

The Blue-winged Warbler is a small, yellow Neotropical migrant songbird with blue-gray wings, two white wingbars, and a black line through its eye. It nests on the ground in shrubby fields, shrub/forest wetlands, utility rights-of-way, and near forest edges. The temporary nature of shrubby and young forest habitat makes this species vulnerable, although proper and targeted forest management can be beneficial for this species.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Birds

Taxa Sub Group: Landbirds

Species Group:

Guild Group: Young Forest Birds

Conservation Target: Young Forest Birds

Conservation Status

State: S/S

S_Rank: S4B,S4N

Federal:

G_Rank: G5

Population Status

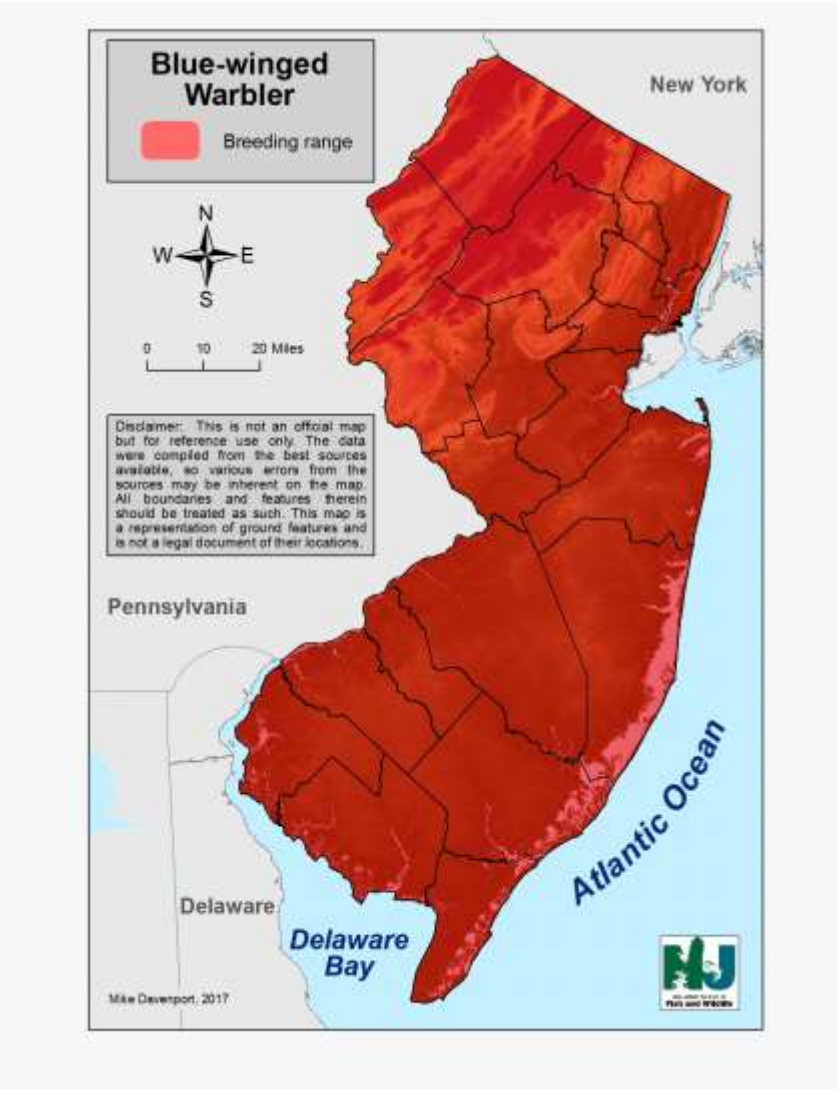
Abundance: Uncommon

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Forest	X
Grassland	X
Shrub	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
	x	x	x	x	x

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Appalachian Mountains Joint Venture. 2015. Appalachian Mountains Joint Venture 3-year Operational Plan 2015-2018. Available from http://amjv.org/documents/AMJV_2015-18_operational_plan_Approved_June_2015.pdf (accessed February 2016).	☐	☐	☑
Partners in Flight Science Committee. 2013. Population Estimates Database, version 2013. Available from http://rmbo.org/pifpopestimates (accessed February 2016).	☑	☐	☐
Rosenberg, K.V., J.A. Kennedy, R. Dettmers, R.P. Ford, D. Reynolds, J.D. Alexander, C.J. Beardmore, P.J. Blancher, R.E. Bogart, G.S. Butcher, A.F. Camfield, A. Couturier, D.W. Demarest, W.E. Easton, J.J. Giocomo, R.H. Keller, A.E. Mini, A.O. Panjabi, D.N. Pashley, T.D. Rich, J.M. Ruth, H. Stabins, J. Stanton, T. Will. 2016. Partners in Flight Landbird Conservation Plan: 2016 Revision for Canada and Continental United States. Partners in Flight Science Committee.	☐	☑	☑
Sauer, J.R., J.E. Hines, J.E. Fallon, K.L. Pardieck, D.J. Ziolkowski, Jr., and W.A. Link. 2014. The North American Breeding Bird Survey, Results and Analysis 1966 - 2013. Version 01.30.2015. USGS Patuxent Wildlife Research Center. Laurel, M.D.	☐	☑	☐

Bobolink

Dolichonyx oryzivorus

The Bobolink is a songbird closely related to blackbirds and orioles. Adult breeding males are mostly black with yellow on the back of the head/neck and white back/rump; females and non-breeding males are brown with dark brown streaks on the back and head. This species nests on the ground in large expanses of early successional/grassland habitat, including hayfields, and is susceptible to impacts from mowing during the nesting season. The temporary nature of early successional/grassland habitat makes this species vulnerable, although proper and targeted management can be beneficial.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Birds

Taxa Sub Group: Landbirds

Species Group:

Guild Group: Grassland Birds

Conservation Target: Grassland Birds

Conservation Status

State: T/SC

S_Rank: S2B,S3N

Federal:

G_Rank: G5

Population Status

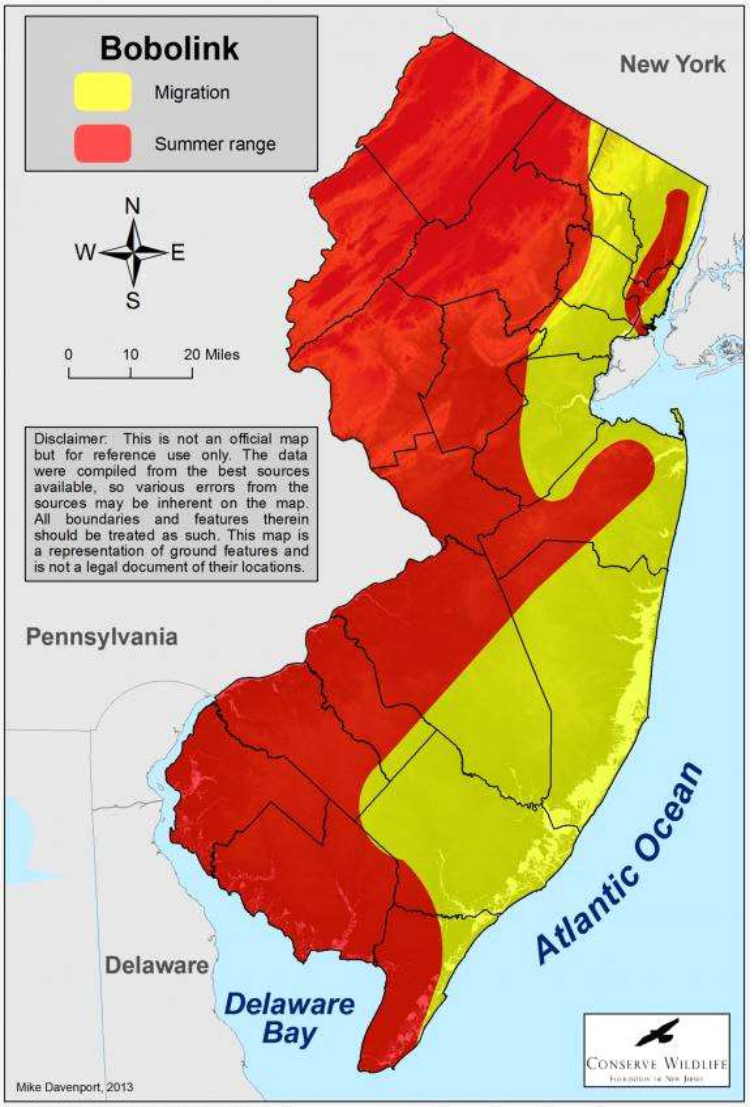
Abundance: Rare

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Grassland	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
		x	x	x	x

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Rosenberg, K.V., J.A. Kennedy, R. Dettmers, R.P. Ford, D. Reynolds, J.D. Alexander, C.J. Beardmore, P.J. Blancher, R.E. Bogart, G.S. Butcher, A.F. Camfield, A. Couturier, D.W. Demarest, W.E. Easton, J.J. Giocomo, R.H. Keller, A.E. Mini, A.O. Panjabi, D.N. Pashley, T.D. Rich, J.M. Ruth, H. Stabins, J. Stanton, T. Will. 2016. Partners in Flight Landbird Conservation Plan: 2016 Revision for Canada and Continental United States. Partners in Flight Science Committee.	☐	☑	☑
Partners in Flight Science Committee. 2013. Population Estimates Database, version 2013. Available from http://rmbo.org/pifpopestimates (accessed February 2016).	☑	☐	☐
Sauer, J.R., J.E. Hines, J.E. Fallon, K.L. Pardieck, D.J. Ziolkowski, Jr., and W.A. Link. 2014. The North American Breeding Bird Survey, Results and Analysis 1966 - 2013. Version 01.30.2015. USGS Patuxent Wildlife Research Center. Laurel, M.D.	☐	☑	☐

Cerulean Warbler

Dendroica cerulea

The Cerulean Warbler is a small blue and white Neotropical migrant songbird with two white wingbars. Males have a dark band across their white throats. These tree-canopy nesters require large expanses of deciduous forest with complex forest structure and are often associated with canopy gaps, internal forest edges, edges of small timber harvests, and narrow utility rights-of-way. Cerulean Warblers are less abundant near the "hard" edges between forest cover and large expanses of open land, but proper and targeted forest management can be beneficial for this species.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Birds

Taxa Sub Group: Landbirds

Species Group:

Guild Group: Forest Birds

Conservation Target: Forest Birds

Conservation Status

State: SC/SC

S_Rank: S3B,S3N

Federal:

G_Rank: G4

Population Status

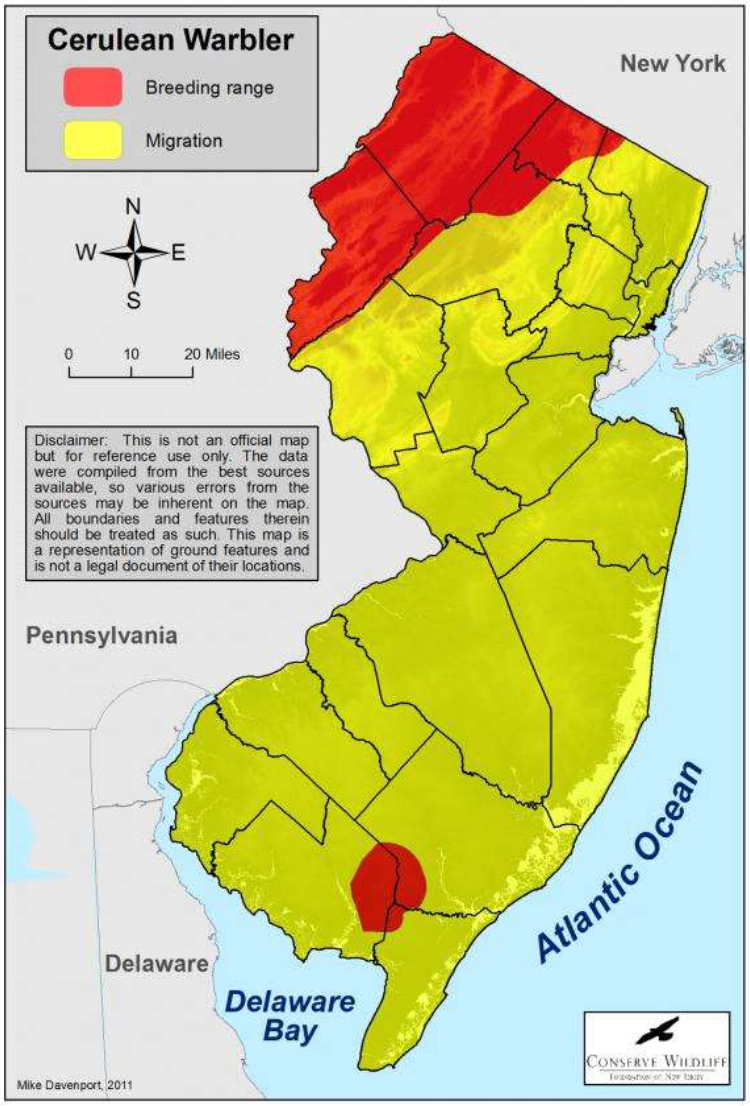
Abundance: Rare

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Forest	X
Shrub	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
			x	x	x

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☐	☐
Partners in Flight Science Committee. 2013. Population Estimates Database, version 2013. Available from http://rmbo.org/pifpopestimates (accessed February 2016).	☑	☐	☐
U.S. Fish and Wildlife Service. 2008. Birds of Conservation Concern 2008. U.S. Department of Interior, Fish and Wildlife Service, Division of Migratory Bird Management. Arlington, V.A. 85 pp. Available from http://www.fws.gov/ (accessed February 2016).	☐	☐	☑
Sauer, J.R., J.E. Hines, J.E. Fallon, K.L. Pardieck, D.J. Ziolkowski, Jr., and W.A. Link. 2014. The North American Breeding Bird Survey, Results and Analysis 1966 - 2013. Version 01.30.2015. USGS Patuxent Wildlife Research Center. Laurel, M.D.	☐	☑	☐
Appalachian Mountains Joint Venture. 2015. Appalachian Mountains Joint Venture 3-year Operational Plan 2015-2018. Available from http://amjv.org/documents/AMJV_2015-18_operational_plan_Approved_June_2015.pdf (accessed February 2016).	☐	☐	☑
The IUCN Red List of Threatened Species. Version 2015-4. Available from www.iucnredlist.org (accessed February 2016).	☐	☐	☑
Rosenberg, K.V., J.A. Kennedy, R. Dettmers, R.P. Ford, D. Reynolds, J.D. Alexander, C.J. Beardmore, P.J. Blancher, R.E. Bogart, G.S. Butcher, A.F. Camfield, A. Couturier, D.W. Demarest, W.E. Easton, J.J. Giocomo, R.H. Keller, A.E. Mini, A.O. Panjabi, D.N. Pashley, T.D. Rich, J.M. Ruth, H. Stabins, J. Stanton, T. Will. 2016. Partners in Flight Landbird Conservation Plan: 2016 Revision for Canada and Continental United States. Partners in Flight Science Committee.	☐	☑	☑

Common Tern

Sterna hirundo

The Common Tern is a medium sized tern that breeds in Atlantic coastal NJ's marshes and, to a lesser degree, beaches. It is an aggressive bird whose dive-bombing behavior helps it ward off predators of its eggs and chicks. Its similar appearance can make it superficially difficult to distinguish from Forster's Terns. One distinction is that Common Terns can often be found nesting in close proximity to Black Skimmers in NJ, which is not true of Forster's colonies in this state. The chicks are semi-precocial and remain within the confines of the colony while waiting for the adults to bring them food. Within 3-4 weeks, the young can fly and typically leave the nesting area shortly after. The impacts of stabilization of the coast combined with sea-level rise are major threats for this species.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Birds

Taxa Sub Group: Waterbirds

Species Group:

Guild Group: Marsh Birds

Conservation Target: Marsh Birds

Conservation Status

State: SC/S

S_Rank: S3B,S4N

Federal:

G_Rank: G5

Population Status

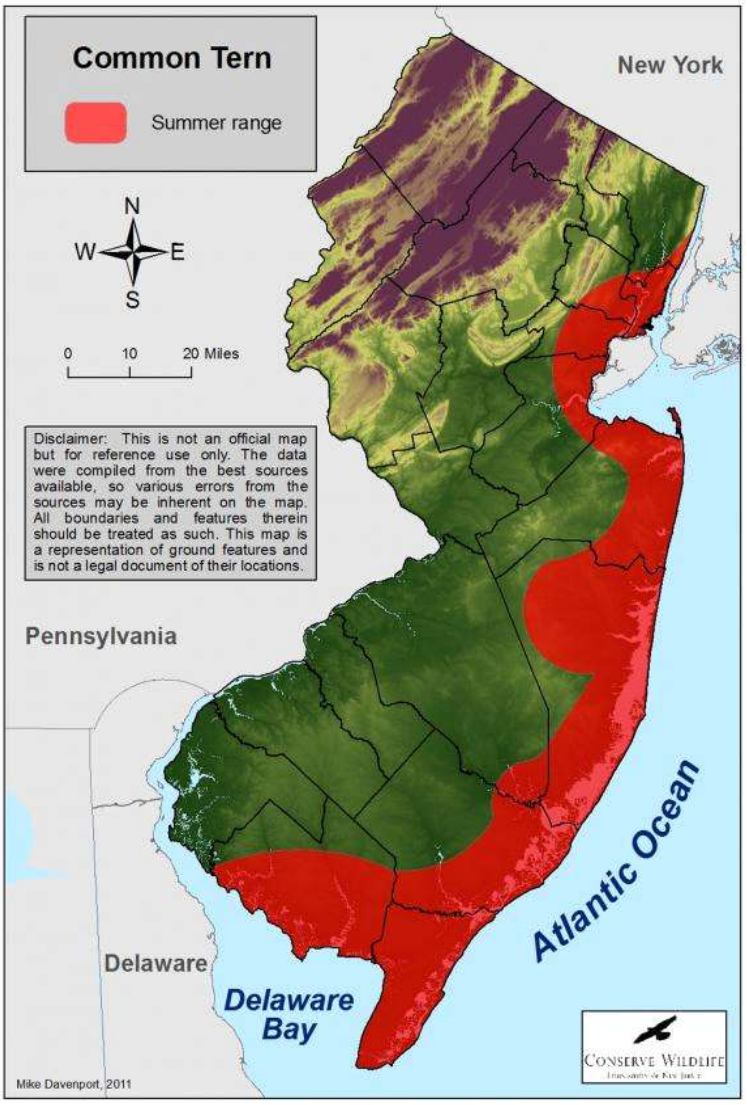
Abundance: Common

Trend: Stable

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Beach and Dune	X
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
x	x	x	x		

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Davis, C. 2015. Colonial Waterbird Aerial Survey. Report NJ W-70-R-1. New Jersey Dept. of Environmental Protection, Division of Fish and Wildlife, Endangered and Nongame Species Program. Trenton, N.J.	☑	☑	☐
Kushlan, J.A. et al. 2002. North American Waterbird Conservation Plan. Available from http://www.waterbirdconservation.org/nawcp.html (accessed February 2016).	☐	☐	☑
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☑	☐

Eastern Meadowlark

Sturnella magna

The Eastern Meadowlark is a medium-sized songbird with a bright yellow belly, black "V" across its chest, and a brown back with dark streaks. This species nests on the ground in large expanses of early successional/grassland habitat, including hayfields, and is susceptible to impacts from mowing during the nesting season. The temporary nature of early successional/grassland habitat makes this species vulnerable, although proper and targeted management can be beneficial.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Birds

Taxa Sub Group: Landbirds

Species Group:

Guild Group: Grassland Birds

Conservation Target: Grassland Birds

Conservation Status

State: SC/SC

S_Rank: S3B,S3N

Federal:

G_Rank: G5

Population Status

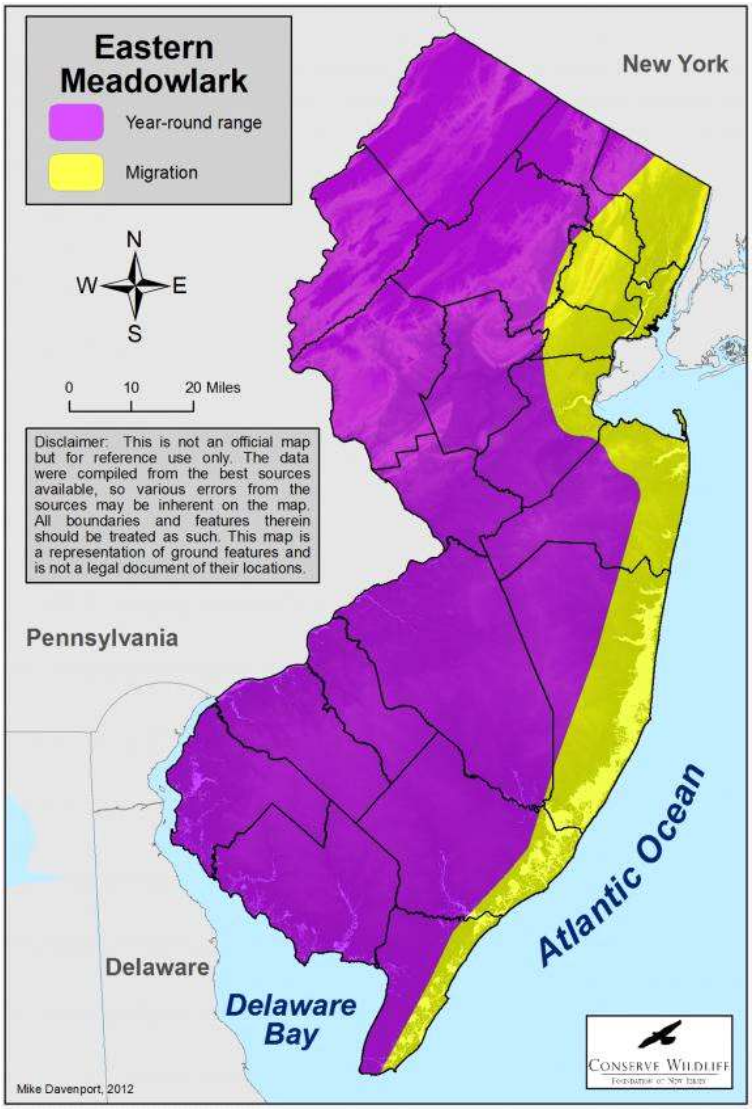
Abundance: Uncommon

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Grassland	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
		x	x	x	x

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Watson, C., and K. Malloy. 2006. The South Atlantic Migratory Bird Initiative Implementation Plan, Version 3.1. 99 pp.	☐	☐	☑
Rosenberg, K.V., J.A. Kennedy, R. Dettmers, R.P. Ford, D. Reynolds, J.D. Alexander, C.J. Beardmore, P.J. Blancher, R.E. Bogart, G.S. Butcher, A.F. Camfield, A. Couturier, D.W. Demarest, W.E. Easton, J.J. Giocomo, R.H. Keller, A.E. Mini, A.O. Panjabi, D.N. Pashley, T.D. Rich, J.M. Ruth, H. Stabins, J. Stanton, T. Will. 2016. Partners in Flight Landbird Conservation Plan: 2016 Revision for Canada and Continental United States. Partners in Flight Science Committee.	☐	☑	☑
Sauer, J.R., J.E. Hines, J.E. Fallon, K.L. Pardieck, D.J. Ziolkowski, Jr., and W.A. Link. 2014. The North American Breeding Bird Survey, Results and Analysis 1966 - 2013. Version 01.30.2015. USGS Patuxent Wildlife Research Center. Laurel, M.D.	☐	☑	☐
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☐	☐
Partners in Flight Science Committee. 2013. Population Estimates Database, version 2013. Available from http://rmbo.org/pifpopestimates (accessed February 2016).	☑	☐	☐

Forster's Tern

Sterna forsteri

The Forster's Tern is a medium sized tern that nests in the Atlantic coastal marshes. It feeds primarily on fish, which it obtains by diving into coastal waters. It lays its eggs on marsh wrack and is susceptible to predators and flooding. Its appearance is very similar to that of Common Terns and care must be taken not to confuse the two. It is one of the few tern species in NJ whose winter range is restricted to North America; other tern species travel farther, into South America. The impacts of stabilization of the coast combined with sea-level rise are major threats.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Birds

Taxa Sub Group: Waterbirds

Species Group:

Guild Group: Marsh Birds

Conservation Target: Marsh Birds

Conservation Status

State: S/S

S_Rank: S4B,S4N

Federal:

G_Rank: G5

Population Status

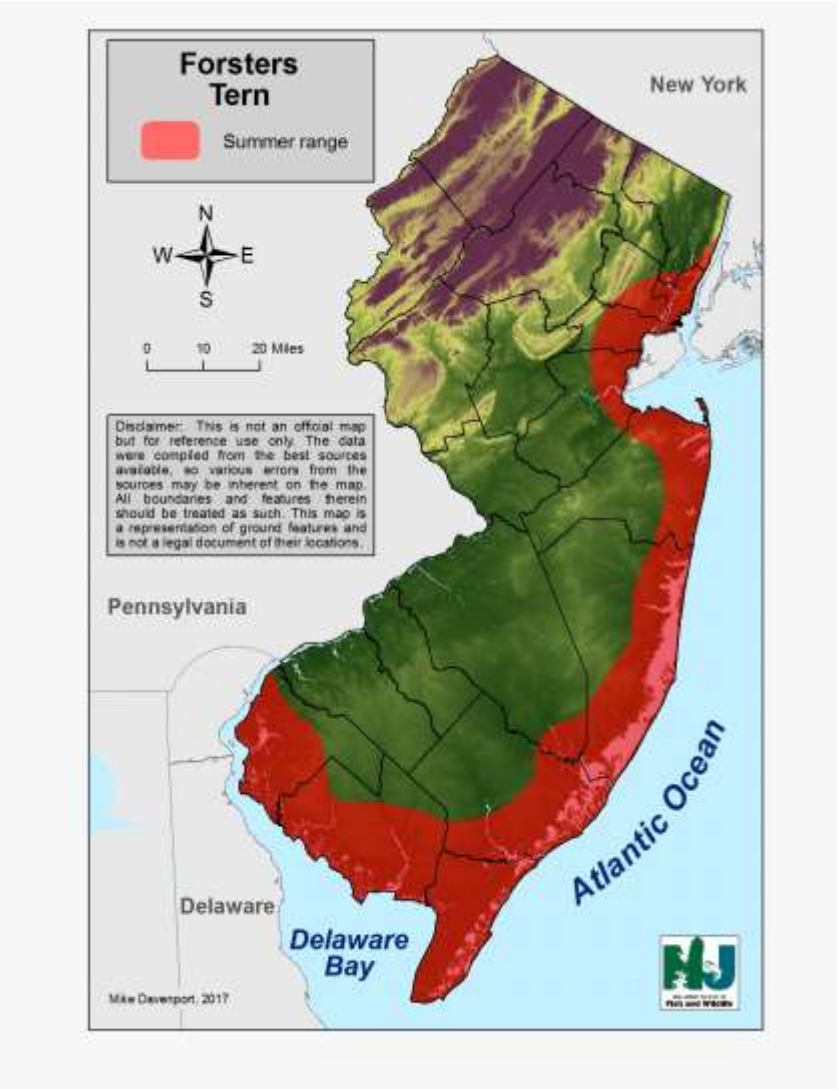
Abundance: Common

Trend: Stable

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Beach and Dune	X
Marine Nearshore Zone	X
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
x	x	x	x		

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Davis, C. 2015. Colonial Waterbird Aerial Survey. Report NJ W-70-R-1. New Jersey Dept. of Environmental Protection, Division of Fish and Wildlife, Endangered and Nongame Species Program. Trenton, N.J.	☑	☑	☐
Kushlan, J.A. et al. 2002. North American Waterbird Conservation Plan. Available from http://www.waterbirdconservation.org/nawcp.html (accessed February 2016).	☐	☐	☑
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☑	☐

Golden-winged Warbler

Vermivora chrysoptera

The Golden-winged Warbler is a small gray and white Neotropical migrant songbird with yellow patches on its wings and a yellow crown. Adult males have a black throat and mask. This species nests on the ground in areas of young forest, shrub/wetland forest, and utility rights-of-way, provided these areas are within a forested landscape that is mostly deciduous. The temporary nature of shrubby and young forest habitat makes this species vulnerable, although proper and targeted forest management can be beneficial for this species.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Birds

Taxa Sub Group: Landbirds

Species Group:

Guild Group: Young Forest Birds

Conservation Target: Young Forest Birds

Conservation Status

State: E/SC

S_Rank: S1B,S3N

Federal:

G_Rank: G4

Population Status

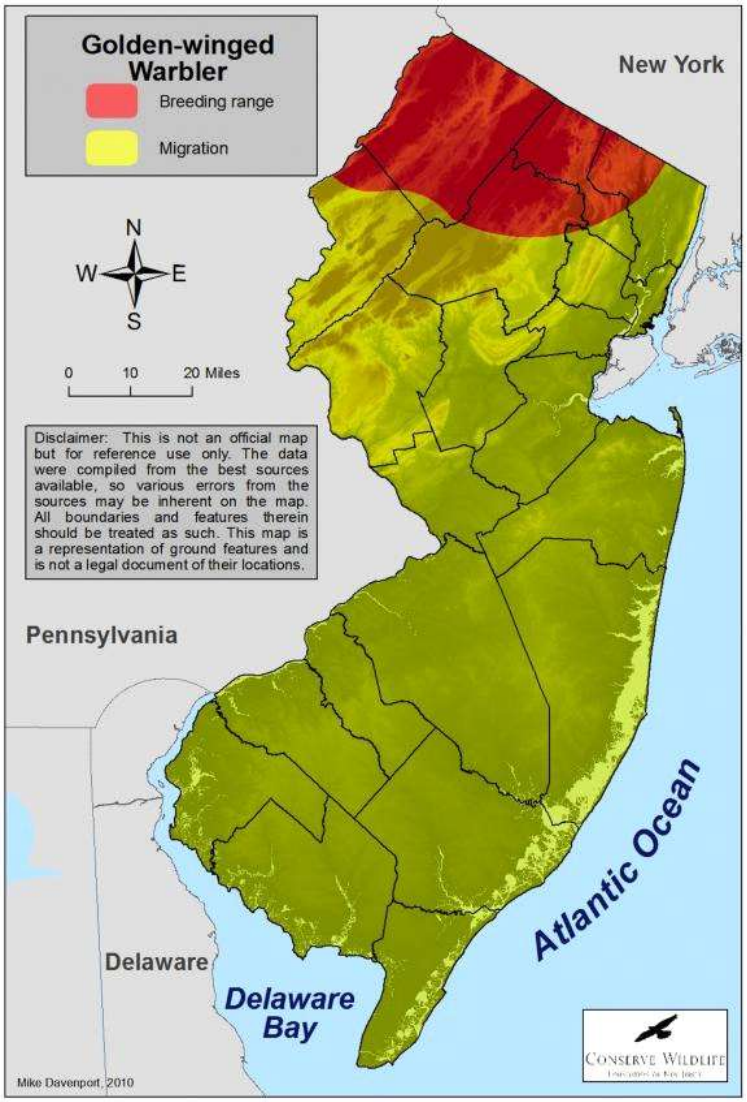
Abundance: Extremely Rare

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Forest	X
Shrub	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
					x

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
U.S. Fish and Wildlife Service. 2008. Birds of Conservation Concern 2008. U.S. Department of Interior, Fish and Wildlife Service, Division of Migratory Bird Management. Arlington, V.A. 85 pp. Available from http://www.fws.gov/ (accessed February 2016).	☐	☐	☑
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☐	☐
Sauer, J.R., J.E. Hines, J.E. Fallon, K.L. Pardieck, D.J. Ziolkowski, Jr., and W.A. Link. 2014. The North American Breeding Bird Survey, Results and Analysis 1966 - 2013. Version 01.30.2015. USGS Patuxent Wildlife Research Center. Laurel, M.D.	☐	☑	☐
Petzinger, S. 2015. Golden-winged Warbler. Report NJ T-1-7. New Jersey Dept. of Environmental Protection, Division of Fish and Wildlife, Endangered and Nongame Species Program. Trenton, N.J.	☑	☐	☐
Partners in Flight Science Committee. 2013. Population Estimates Database, version 2013. Available from http://rmbo.org/pifpopestimates (accessed February 2016).	☑	☐	☐
Appalachian Mountains Joint Venture. 2015. Appalachian Mountains Joint Venture 3-year Operational Plan 2015-2018. Available from http://amjv.org/documents/AMJV_2015-18_operational_plan_Approved_June_2015.pdf (accessed February 2016).	☐	☐	☑
The IUCN Red List of Threatened Species. Version 2015-4. Available from www.iucnredlist.org (accessed February 2016).	☐	☐	☑

Rosenberg, K.V., J.A. Kennedy, R. Dettmers, R.P. Ford, D. Reynolds, J.D. Alexander, C.J. Beardmore, P.J. Blancher, R.E. Bogart, G.S. Butcher, A.F. Camfield, A. Couturier, D.W. Demarest, W.E. Easton, J.J. Giocomo, R.H. Keller, A.E. Mini, A.O. Panjabi, D.N. Pashley, T.D. Rich, J.M. Ruth, H. Stabins, J. Stanton, T. Will. 2016. Partners in Flight Landbird Conservation Plan: 2016 Revision for Canada and Continental United States. Partners in Flight Science Committee.	☐	☑	☑

Grasshopper Sparrow

Ammodramus savannarum

The Grasshopper Sparrow is a small, brown songbird with an unmarked chest, large head, short tail, and dark crown with a pale middle stripe. Most often heard than seen, the male's song consists of two notes followed by a long, insect-like buzz (like a grasshopper). This species nests on the ground in large expanses of early successional/grassland habitat, including hayfields, and is susceptible to impacts from mowing during the nesting season. The temporary nature of early successional/grassland habitat makes this species vulnerable, although proper and targeted management can be beneficial.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Birds

Taxa Sub Group: Landbirds

Species Group:

Guild Group: Grassland Birds

Conservation Target: Grassland Birds

Conservation Status

State: T/SC

S_Rank: S2B,S3N

Federal:

G_Rank: G5

Population Status

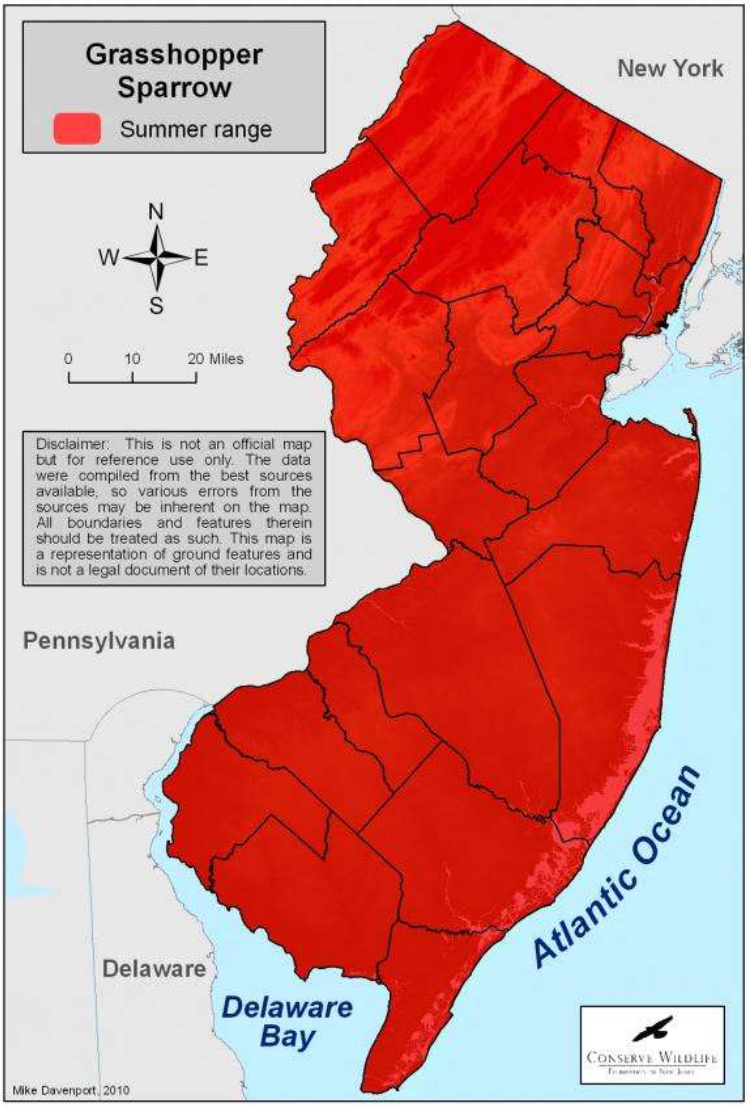
Abundance: Uncommon

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Grassland	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
		x	x	x	x

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Watson, J.K. 2014. The Piedmont Bird Conservation Regions (BCR 29) Implementation Plan, V1.1. 136 pp. Available from http://acjv.org/documents/piedmont-2014.pdf (accessed February 2016).	☐	☐	☑
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☐	☐
Sauer, J.R., J.E. Hines, J.E. Fallon, K.L. Pardieck, D.J. Ziolkowski, Jr., and W.A. Link. 2014. The North American Breeding Bird Survey, Results and Analysis 1966 - 2013. Version 01.30.2015. USGS Patuxent Wildlife Research Center. Laurel, M.D.	☐	☑	☐
Watson, C., and K. Malloy. 2006. The South Atlantic Migratory Bird Initiative Implementation Plan, Version 3.1. 99 pp.	☐	☐	☑
Rosenberg, K.V., J.A. Kennedy, R. Dettmers, R.P. Ford, D. Reynolds, J.D. Alexander, C.J. Beardmore, P.J. Blancher, R.E. Bogart, G.S. Butcher, A.F. Camfield, A. Couturier, D.W. Demarest, W.E. Easton, J.J. Giocomo, R.H. Keller, A.E. Mini, A.O. Panjabi, D.N. Pashley, T.D. Rich, J.M. Ruth, H. Stabins, J. Stanton, T. Will. 2016. Partners in Flight Landbird Conservation Plan: 2016 Revision for Canada and Continental United States. Partners in Flight Science Committee.	☐	☑	☑
Partners in Flight Science Committee. 2013. Population Estimates Database, version 2013. Available from http://rmbo.org/pifpopestimates (accessed February 2016).	☑	☐	☐

Kentucky Warbler

Oporornis formosus

The Kentucky Warbler is a small yellow Neotropical migrant songbird with an olive green back, black "sideburns", and yellow spectacles. This ground nester requires large expanses of deciduous forest with well-developed ground cover and thick understory. Kentucky Warblers are more abundant in moist forests, such as bottomland hardwoods or near streams, and avoid agricultural areas. Proper and targeted forest management can be beneficial for this species.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Birds

Taxa Sub Group: Landbirds

Species Group:

Guild Group: Forest Birds

Conservation Target: Forest Birds

Conservation Status

State: SC/SC

S_Rank: S3B,S3N

Federal:

G_Rank: G5

Population Status

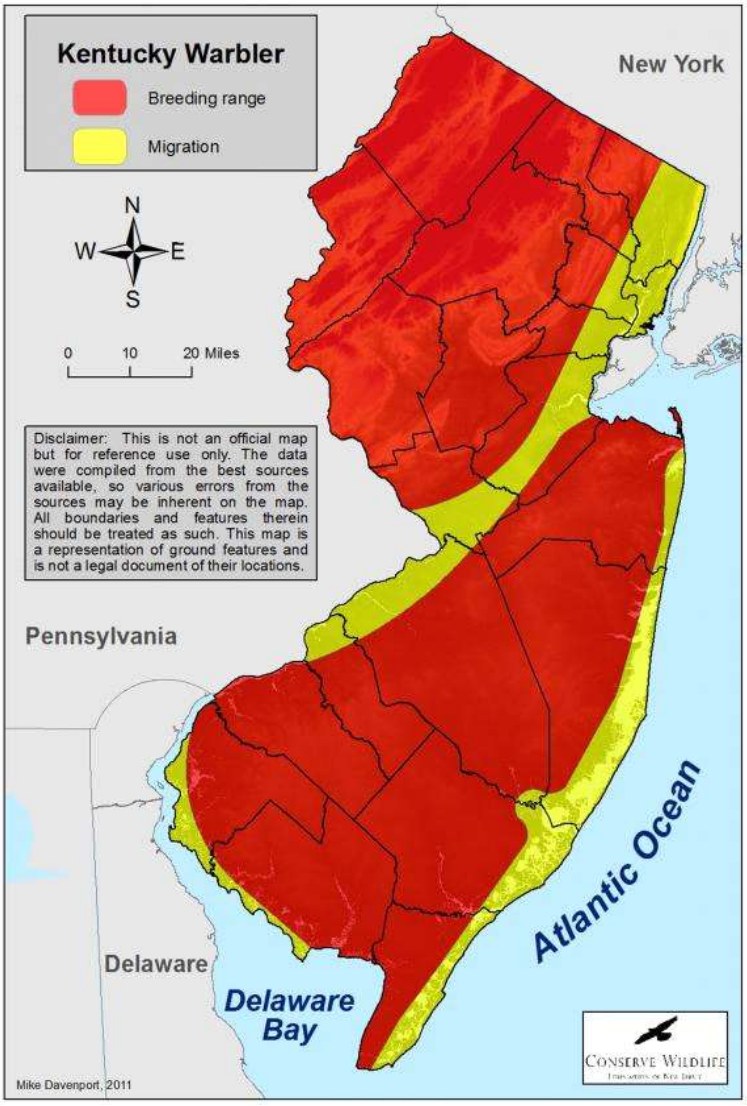
Abundance: Extremely Rare

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Forest	X
Shrub	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
		x	x	x	x

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Steinkamp, M. 2008. New England/Mid-Atlantic Coast Bird Conservation Region (BCR 30) Implementation Plan. U.S. Department of Interior, Fish and Wildlife Service, Northeast Regional Office. Hadley, M.A. 251 pp.	☐	☐	☑
Partners in Flight Science Committee. 2013. Population Estimates Database, version 2013. Available from http://rmbo.org/pifpopestimates (accessed February 2016).	☑	☐	☐
Appalachian Mountains Joint Venture. 2015. Appalachian Mountains Joint Venture 3-year Operational Plan 2015-2018. Available from http://amjv.org/documents/AMJV_2015-18_operational_plan_Approved_June_2015.pdf (accessed February 2016).	☐	☐	☑
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☐	☐
U.S. Fish and Wildlife Service. 2008. Birds of Conservation Concern 2008. U.S. Department of Interior, Fish and Wildlife Service, Division of Migratory Bird Management. Arlington, V.A. 85 pp. Available from http://www.fws.gov/ (accessed February 2016).	☐	☐	☑
Sauer, J.R., J.E. Hines, J.E. Fallon, K.L. Pardieck, D.J. Ziolkowski, Jr., and W.A. Link. 2014. The North American Breeding Bird Survey, Results and Analysis 1966 - 2013. Version 01.30.2015. USGS Patuxent Wildlife Research Center. Laurel, M.D.	☐	☑	☐
Rosenberg, K.V., J.A. Kennedy, R. Dettmers, R.P. Ford, D. Reynolds, J.D. Alexander, C.J. Beardmore, P.J. Blancher, R.E. Bogart, G.S. Butcher, A.F. Camfield, A. Couturier, D.W. Demarest, W.E. Easton, J.J. Giocomo, R.H. Keller, A.E. Mini, A.O. Panjabi, D.N. Pashley, T.D. Rich, J.M. Ruth, H. Stabins, J. Stanton, T. Will. 2016. Partners in Flight Landbird Conservation Plan: 2016 Revision for Canada and Continental United States. Partners in Flight Science Committee.	☐	☑	☑

Least Tern

Sternula antillarum

The Least Tern is the smallest tern in North America and nests on the beaches and marshes of the Atlantic NJ coast. It feeds exclusively on fish, which it obtains by diving for them in coastal waters, such as oceans and bays. Its eggs are laid directly on the sand and its chicks are semi-precocial. They are mobile but rely on the adults to feed them. The adults are aggressive, dive-bombing predators, yet their diminutive size means this tactic is not overly effective. Like other coastal bird species, human generated disturbance and sea level rise (coupled with a stabilized coast) are among their primary threats.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Birds

Taxa Sub Group: Waterbirds

Species Group:

Guild Group: Beach nesting Birds

Conservation Target: Beach nesting Birds

Conservation Status

State: E/E

S_Rank: S1B,S1N

Federal:

G_Rank: G4

Population Status

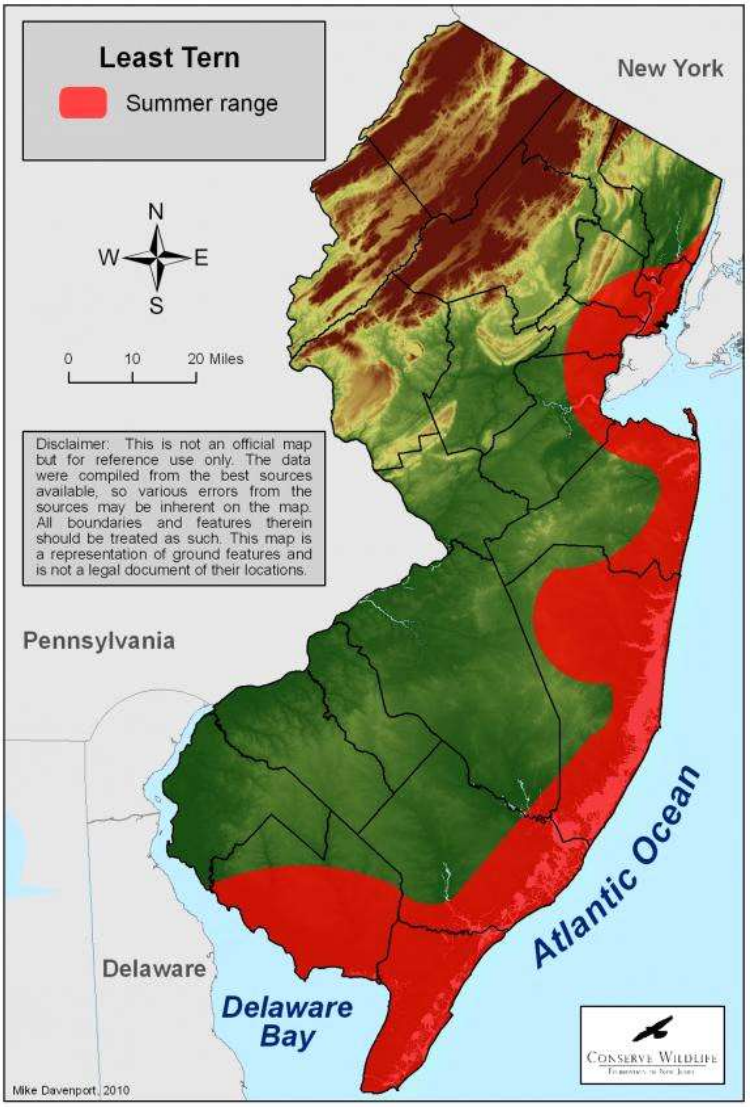
Abundance: Rare

Trend: Stable

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Beach and Dune	X
Marine Nearshore Zone	X
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
x	x	x	x		

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☑	☐
Kushlan, J.A. et al. 2002. North American Waterbird Conservation Plan. Available from http://www.waterbirdconservation.org/nawcp.html (accessed February 2016).	☐	☐	☑
Davis, C. 2015. Beach nesting birds. Report NJ T-1-7. New Jersey Dept. of Environmental Protection, Division of Fish and Wildlife, Endangered and Nongame Species Program. Trenton, N.J.	☑	☑	☐

Little Blue Heron

Egretta caerulea

The Little Blue Heron is a small wading bird that nests in mixed species colonies in scrub-shrub and phragmites habitat in Atlantic coastal marshes of NJ. New Jersey is on the northern part of their breeding range and numbers have never been very high, but inventory counts indicate they have declined from historical highs (declines have leveled off). Little Blue Herons forage by stalking their prey from a stationary position, spearing it when opportunity allows. In its first year, the bird's plumage is white before molting to the adult purplish-blue. The impacts of stabilization of the coast combined with sea-level rise are major threats for this species.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Birds

Taxa Sub Group: Waterbirds

Species Group:

Guild Group: Marsh Birds

Conservation Target: Marsh Birds

Conservation Status

State: SC/SC

S_Rank: S3B,S3N

Federal:

G_Rank: G5

Population Status

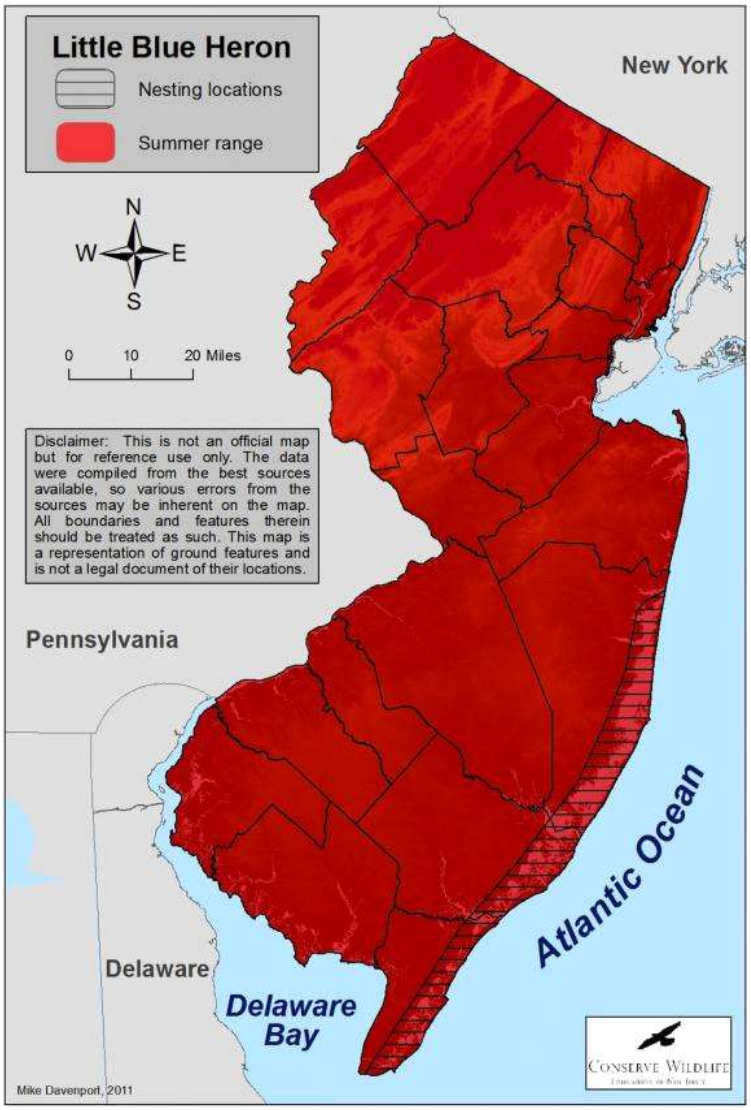
Abundance: Rare

Trend: Stable

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
	x	x	x	x	

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Kushlan, J.A. et al. 2002. North American Waterbird Conservation Plan. Available from http://www.waterbirdconservation.org/nawcp.html (accessed February 2016).	☐	☐	☑
Davis, C. 2015. Colonial Waterbird Aerial Survey. Report NJ W-70-R-1. New Jersey Dept. of Environmental Protection, Division of Fish and Wildlife, Endangered and Nongame Species Program. Trenton, N.J.	☑	☑	☐
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☑	☐

Northern Bobwhite

Colinus virginianus

The Northern Bobwhite is a small quail with a small head, round wings, and a short tail. Males are patterned brown with white and black on their heads and throats; females look similar but have a light brown on their heads and throats. Bobwhites nest on the ground in areas with an open, grassy ground layer such as open pine forests, overgrown fields, shrublands, and grasslands. The temporary nature of early successional/grassland habitat makes this species vulnerable, although proper and targeted management can be beneficial.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Birds

Taxa Sub Group: Landbirds

Species Group:

Guild Group: Young Forest Birds

Conservation Target: Young Forest Birds

Conservation Status

State:

S_Rank: S5B,S5N

Federal:

G_Rank: G5

Population Status

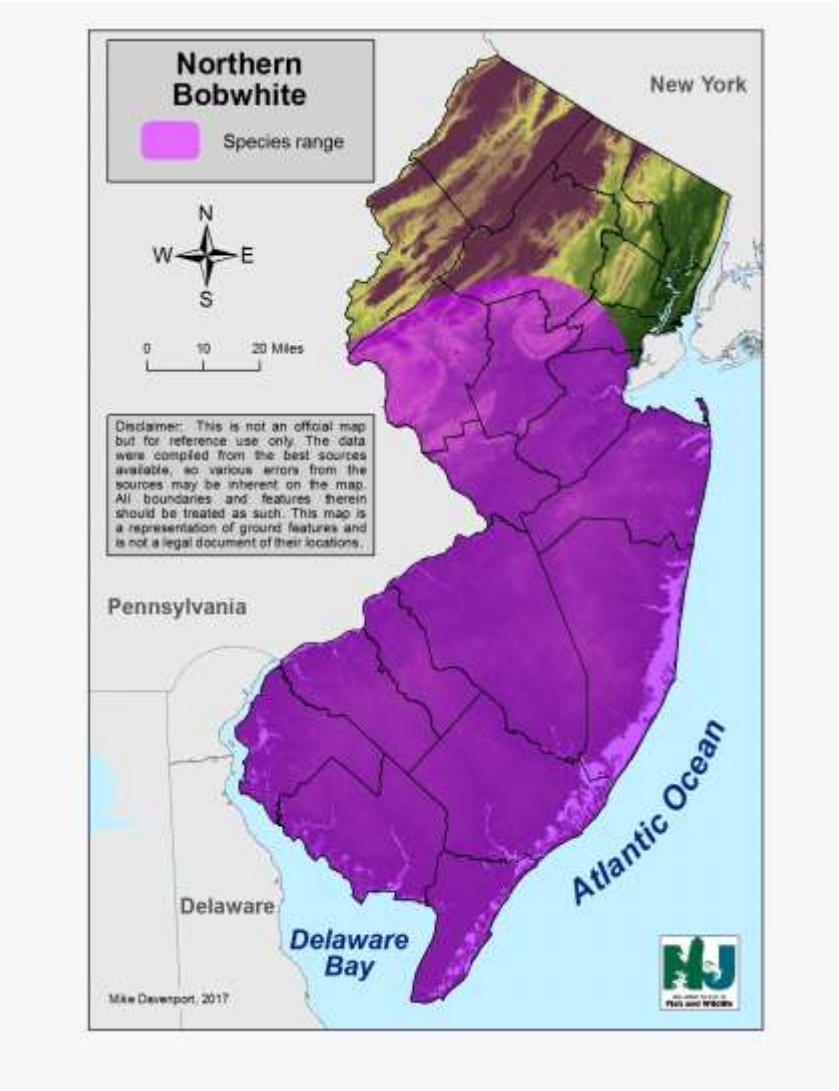
Abundance: Extremely Rare

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Forest	X
Grassland	X
Shrub	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
		x	x	x	

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Steinkamp, M. 2008. New England/Mid-Atlantic Coast Bird Conservation Region (BCR 30) Implementation Plan. U.S. Department of Interior, Fish and Wildlife Service, Northeast Regional Office. Hadley, M.A. 251 pp.	☐	☐	☑
The IUCN Red List of Threatened Species. Version 2015-4. Available from www.iucnredlist.org (accessed February 2016).	☐	☐	☑
Sauer, J.R., J.E. Hines, J.E. Fallon, K.L. Pardieck, D.J. Ziolkowski, Jr., and W.A. Link. 2014. The North American Breeding Bird Survey, Results and Analysis 1966 - 2013. Version 01.30.2015. USGS Patuxent Wildlife Research Center. Laurel, M.D.	☐	☑	☐
Rosenberg, K.V., J.A. Kennedy, R. Dettmers, R.P. Ford, D. Reynolds, J.D. Alexander, C.J. Beardmore, P.J. Blancher, R.E. Bogart, G.S. Butcher, A.F. Camfield, A. Couturier, D.W. Demarest, W.E. Easton, J.J. Giocomo, R.H. Keller, A.E. Mini, A.O. Panjabi, D.N. Pashley, T.D. Rich, J.M. Ruth, H. Stabins, J. Stanton, T. Will. 2016. Partners in Flight Landbird Conservation Plan: 2016 Revision for Canada and Continental United States. Partners in Flight Science Committee.	☐	☑	☑
Burnett, A., and K. Duren. 2011. Current status of northern bobwhite in New Jersey. Report NJ W68R15.10-11. New Jersey Dept. of Environmental Protection, Division of Fish and Wildlife, Bureau of Wildlife Management. Trenton, N.J.	☑	☑	☐
Watson, J.K. 2014. The Piedmont Bird Conservation Regions (BCR 29) Implementation Plan, V1.1. 136 pp. Available from http://acjv.org/documents/piedmont-2014.pdf (accessed February 2016).	☑	☑	☑

Northern Harrier

Circus cyaneus

The Northern Harrier is found in NJ year round in larger tracts of marsh and field habitats. The decline in large and fallow grasslands in the state has contributed to its decline. However, its main nesting range has been Atlantic and Delaware Bay coastal marshes, where harriers rely on high marsh (which floods infrequently, compared to low marsh that floods daily). High marsh habitats along the coasts have declined due to management and other factors that have favored low marsh habitat.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Birds

Taxa Sub Group: Landbirds

Species Group: Raptors

Guild Group: Marsh Birds

Conservation Target: Northern Harrier

Conservation Status

State: E/SC

S_Rank: S1B,S3N

Federal:

G_Rank: G5

Population Status

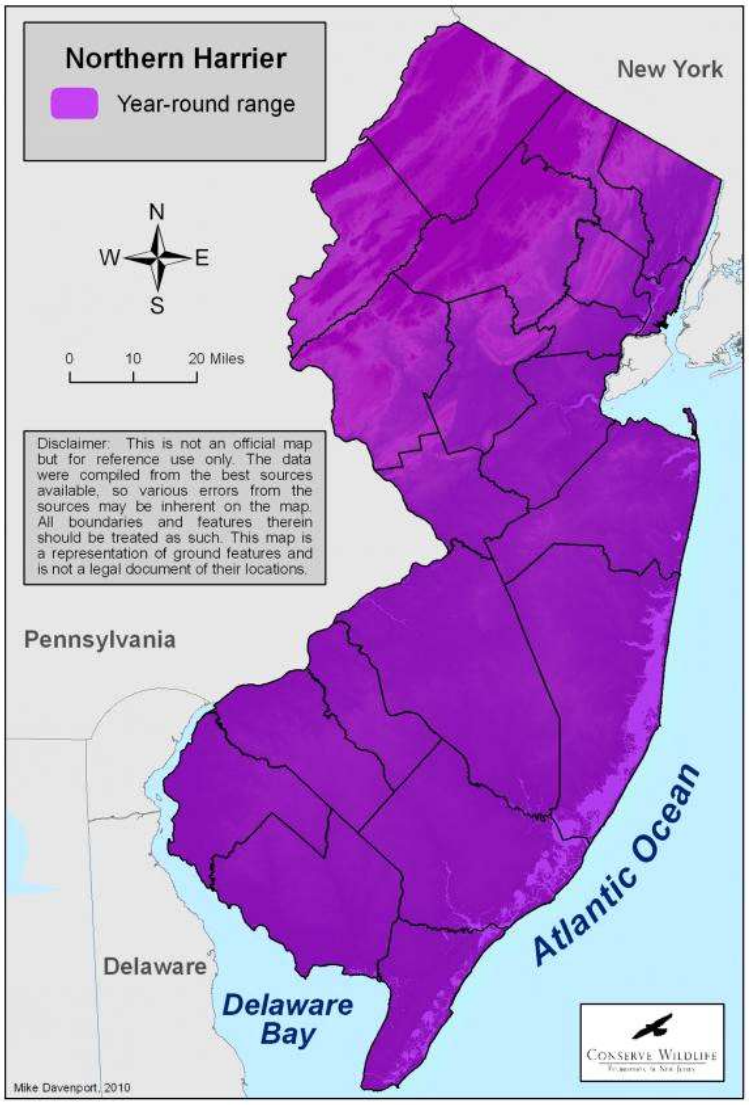
Abundance: Rare

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Grassland	X
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
	x	x	x		x

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Sauer, J.R., J.E. Hines, J.E. Fallon, K.L. Pardieck, D.J. Ziolkowski, Jr., and W.A. Link. 2014. The North American Breeding Bird Survey, Results and Analysis 1966 - 2013. Version 01.30.2015. USGS Patuxent Wildlife Research Center. Laurel, M.D.	☐	☑	☐
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☐	☐

Peregrine Falcon

Falco peregrinus

The Peregrine Falcon is a raptor found statewide but with specialized requirements that limit its nesting range in the state to elevated structures (e.g., buildings, bridges, cliffs). As a top-level predator feeding on resident and migratory birds, it is vulnerable to the adverse effects of contaminants in the environment, both those prevalent in the US and elsewhere in the Western Hemisphere.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Birds

Taxa Sub Group: Landbirds

Species Group: Raptors

Guild Group:

Conservation Target: Peregrine Falcon

Conservation Status

State: E/SC

S_Rank: S1B,S3N

Federal:

G_Rank: G4

Population Status

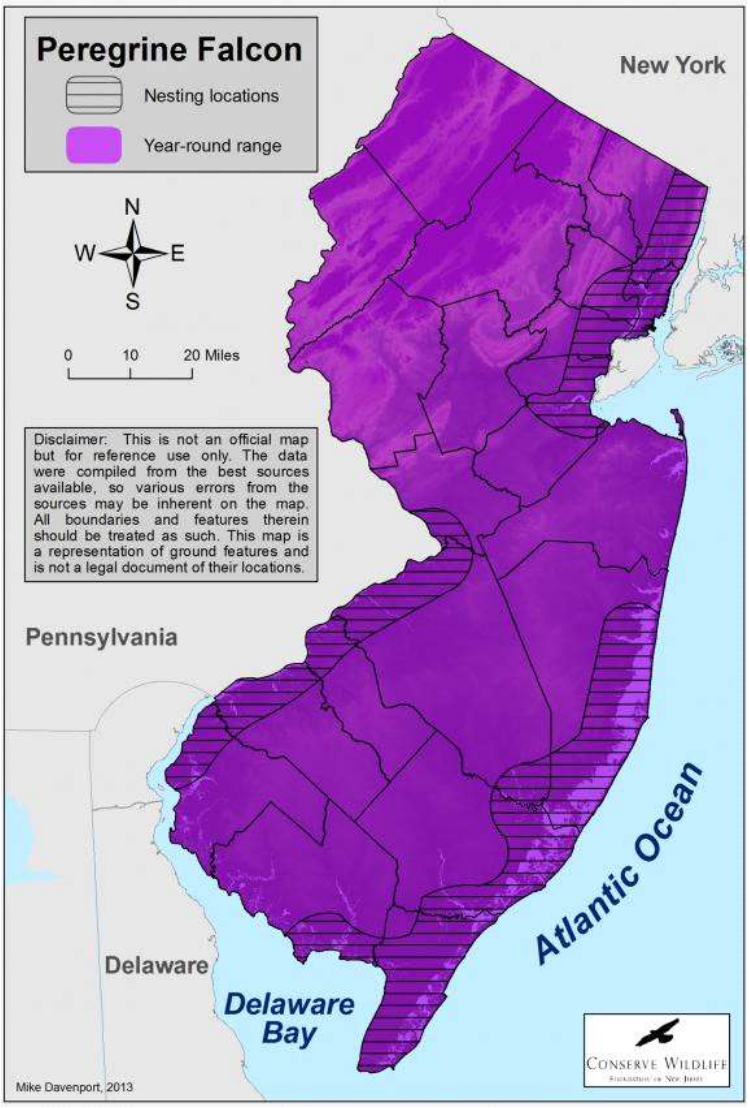
Abundance: Uncommon

Trend: Stable

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Beach and Dune	X
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
	x	x	x		x

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
U.S. Fish and Wildlife Service. 2003. Monitoring Plan for the American Peregrine Falcon, A Species Recovered Under the Endangered Species Act. U.S. Fish and Wildlife Service, Divisions of Endangered Species and Migratory Birds and State Programs, Pacific Region, Portland, O.R. 53 pp. Available from https://www.fws.gov/endangered/esa-library/pdf/Peregrineplan2003.pdf (accessed February 2016).	☐	☐	☑
Clark, K., B. Wurst, and J. Heilferty. 2015. Peregrine Falcon Research and Management Program in NJ, 2015. New Jersey Dept. of Environmental Protection, Division of Fish and Wildlife, Endangered and Nongame Species Program. Trenton, N.J. Available from http://njfishandwildlife.com/ensp/pdf/pefa15_report.pdf (accessed February 2016).	☑	☑	☐

Pied-billed Grebe

Podilymbus podiceps

Pied-billed Grebes are small, secretive birds that nest in freshwater marshes, lakes and estuaries in NJ. They are diving birds and exhibit excellent control over their buoyancy. They have a number of interesting behaviors, including carrying their young on their backs, and consuming their own feathers to assist in digestion. This species occurs in low numbers in the state and is difficult to survey, but is known to be vulnerable to disturbance and freshwater wetland loss.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Birds

Taxa Sub Group: Waterbirds

Species Group:

Guild Group: Marsh Birds

Conservation Target: Pied-billed Grebe

Conservation Status

State: E/SC

S_Rank: S1B,S3N

Federal:

G_Rank: G5

Population Status

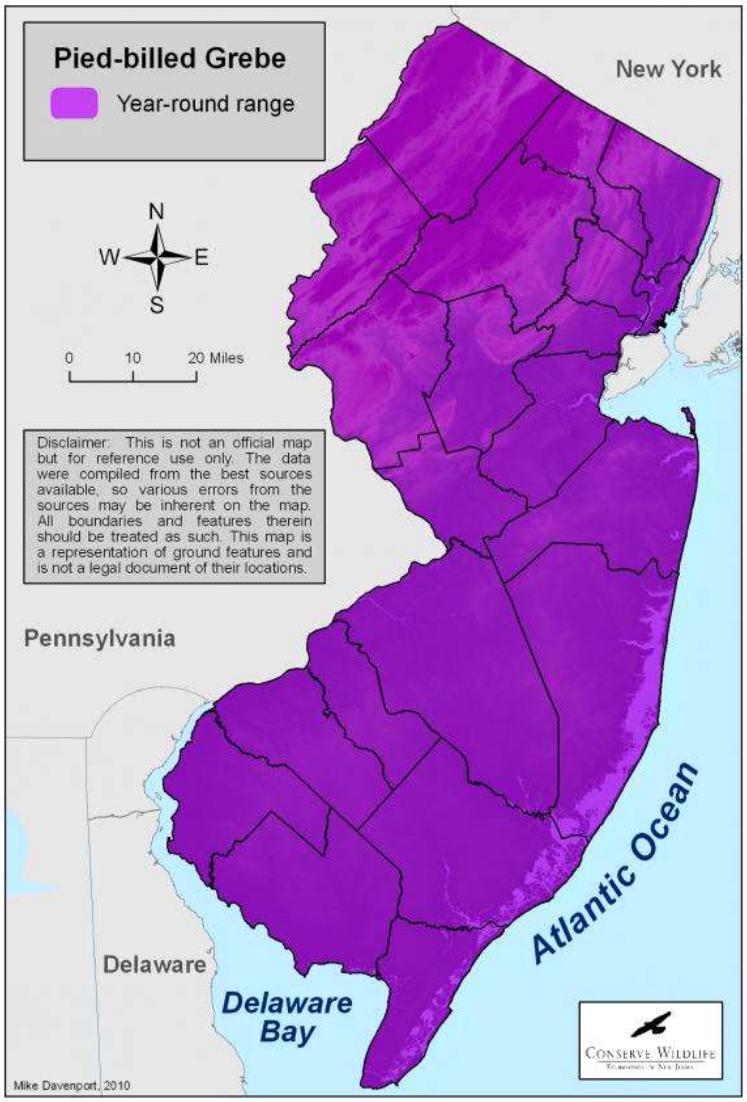
Abundance: Uncommon

Trend: Unknown

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Coldwater Stream	X
Warmwater Stream	X
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
	x	x	x	x	x

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Kushlan, J.A. et al. 2002. North American Waterbird Conservation Plan. Available from http://www.waterbirdconservation.org/nawcp.html (accessed February 2016).	☐	☐	☑
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☑	☐

Piping Plover

Charadrius melodus

The Piping Plover is a small shorebird that is Federally Threatened and State Endangered. It nests exclusively in the Coastal Region and only on beaches in NJ, where it lays its eggs directly on the sand, relying on camouflage for protection. The chicks are precocial and are walking and feeding themsevles within hours of hatching. Like other coastal bird species, human generated disturbance and sea level rise (coupled with a stabilized coast) are among their primary threats.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Birds

Taxa Sub Group: Waterbirds

Species Group:

Guild Group: Beach nesting Birds

Conservation Target: Beach nesting Birds

Conservation Status

State: E/E

S_Rank: S1B,S1N

Federal:

G_Rank: G3

Population Status

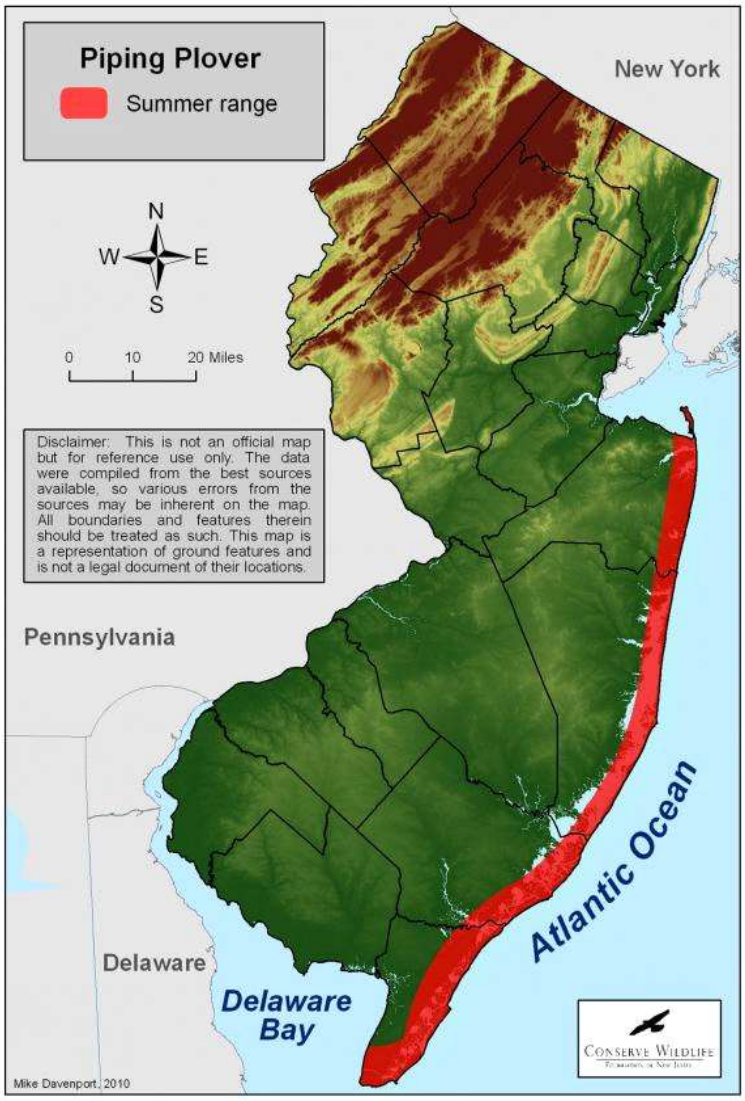
Abundance: Rare

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Beach and Dune	X
Tidal Mudflat	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
	x				

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☑	☐
U.S. Fish and Wildlife Service. 1996. Piping Plover (Charadrius melodus) Atlantic Coast Population Revised Recovery Plan. USFWS, Hadley, M.A. Available from http://www.fws.gov/northeast/pipingplover/recovery.html (accessed February 2016).	☑	☑	☑
U.S. Fish and Wildlife Service. 2009. Piping plover (Charadrius melodus) 5-Year review Summary and Evaluation. Northeast Region (Hadley, M.A., USA) and Midwest Region Field Office (East Lansing, M.I., USA). Available from http://www.fws.gov/northeast/endangered/PDF/Piping_Plover_five_year_review_and_summary.pdf (accessed February 2016).	☑	☑	☐
Davis, C. 2015. Beach nesting birds. Report NJ T-1-7. New Jersey Dept. of Environmental Protection, Division of Fish and Wildlife, Endangered and Nongame Species Program. Trenton, N.J.	☑	☑	☐

Prothonotary Warbler

Protonotaria citrea

The Prothonotary Warbler is a small Neotropical migrant songbird, but larger than most other warblers. It has a bright, deep yellow color on its head and chest with no markings, black eyes, green back, and gray wings. This cavity-nester breeds in bottomland forests and other wooded swamps.

SWAP Classification

Broad Group: Terrestrial Wildlife
Taxon: Birds
Taxa Sub Group: Landbirds
Species Group:
Guild Group: Forest Birds
Conservation Target: Forest Birds

Conservation Status

State: S/S
S_Rank: S4B,S4N
Federal:
G_Rank: G5

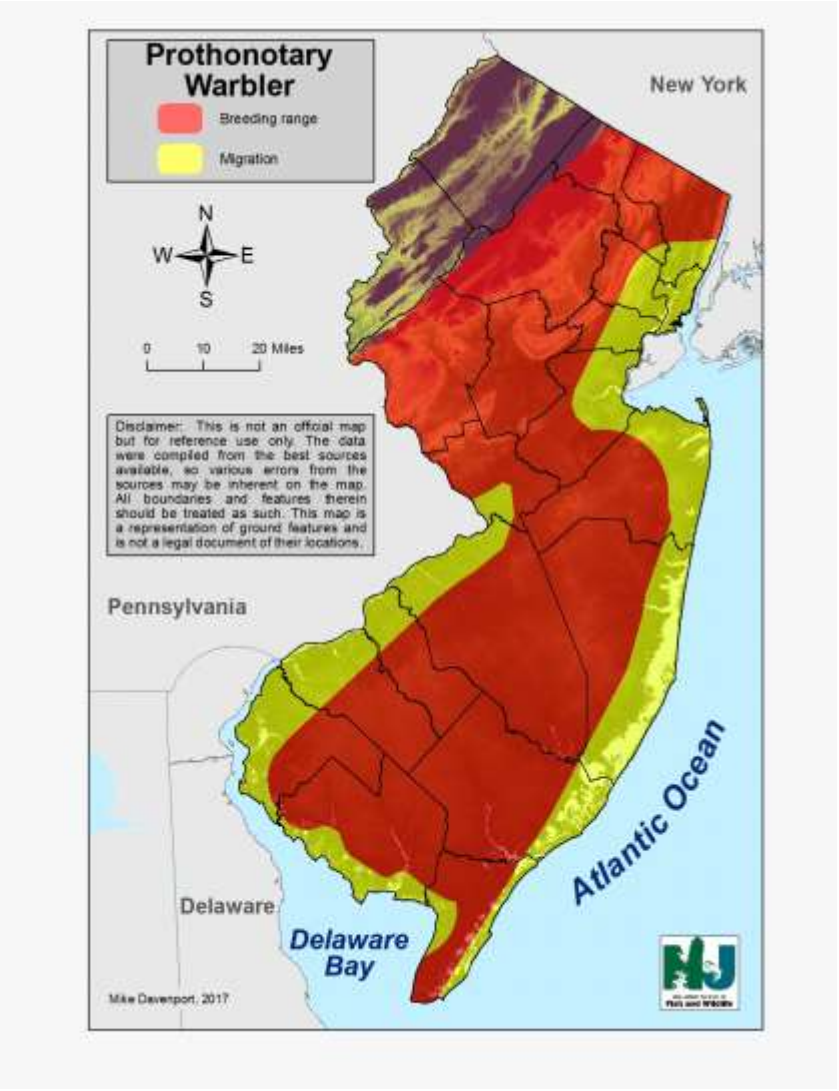
Population Status

Abundance: Extremely Rare
Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Forest	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
		x	x	x	

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Steinkamp, M. 2008. New England/Mid-Atlantic Coast Bird Conservation Region (BCR 30) Implementation Plan. U.S. Department of Interior, Fish and Wildlife Service, Northeast Regional Office. Hadley, M.A. 251 pp.	☐	☐	☑
Partners in Flight Science Committee. 2013. Population Estimates Database, version 2013. Available from http://rmbo.org/pifpopestimates (accessed February 2016).	☑	☐	☐
Rosenberg, K.V., J.A. Kennedy, R. Dettmers, R.P. Ford, D. Reynolds, J.D. Alexander, C.J. Beardmore, P.J. Blancher, R.E. Bogart, G.S. Butcher, A.F. Camfield, A. Couturier, D.W. Demarest, W.E. Easton, J.J. Giocomo, R.H. Keller, A.E. Mini, A.O. Panjabi, D.N. Pashley, T.D. Rich, J.M. Ruth, H. Stabins, J. Stanton, T. Will. 2016. Partners in Flight Landbird Conservation Plan: 2016 Revision for Canada and Continental United States. Partners in Flight Science Committee.	☐	☑	☑
Watson, C., and K. Malloy. 2006. The South Atlantic Migratory Bird Initiative Implementation Plan, Version 3.1. 99 pp.	☐	☐	☑
Sauer, J.R., J.E. Hines, J.E. Fallon, K.L. Pardieck, D.J. Ziolkowski, Jr., and W.A. Link. 2014. The North American Breeding Bird Survey, Results and Analysis 1966 - 2013. Version 01.30.2015. USGS Patuxent Wildlife Research Center. Laurel, M.D.	☐	☑	☐

Red Knot

Calidris canutus

The Red Knot is a robin-sized shorebird found in NJ primarily during its spring migration between South American wintering and Arctic nesting areas. In May to early June, Red Knots and other shorebirds concentrate on Delaware Bay beaches to take advantage of the high densities of spawning horseshoe crabs and crab eggs. Fat-rich crab eggs allow birds to make large, rapid weight gains, important for survival and reproduction. In late summer/early fall, Red Knots stop on the NJ Atlantic coast to fatten before making non-stop trans-ocean flights to South America; some remain in NJ for >=2.5 months to grow new flight feathers before migrating south. Its long migration path and limited number of quality stopover sites make this Red Knots vulnerable to disruption of critical resources, catastrophic events, and sea-level rise.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Birds

Taxa Sub Group: Waterbirds

Species Group:

Guild Group: Migrant shorebirds

Conservation Target: Migrant Shorebirds

Conservation Status

State: NA/E

S_Rank: S1N

Federal:

G_Rank: G4

Population Status

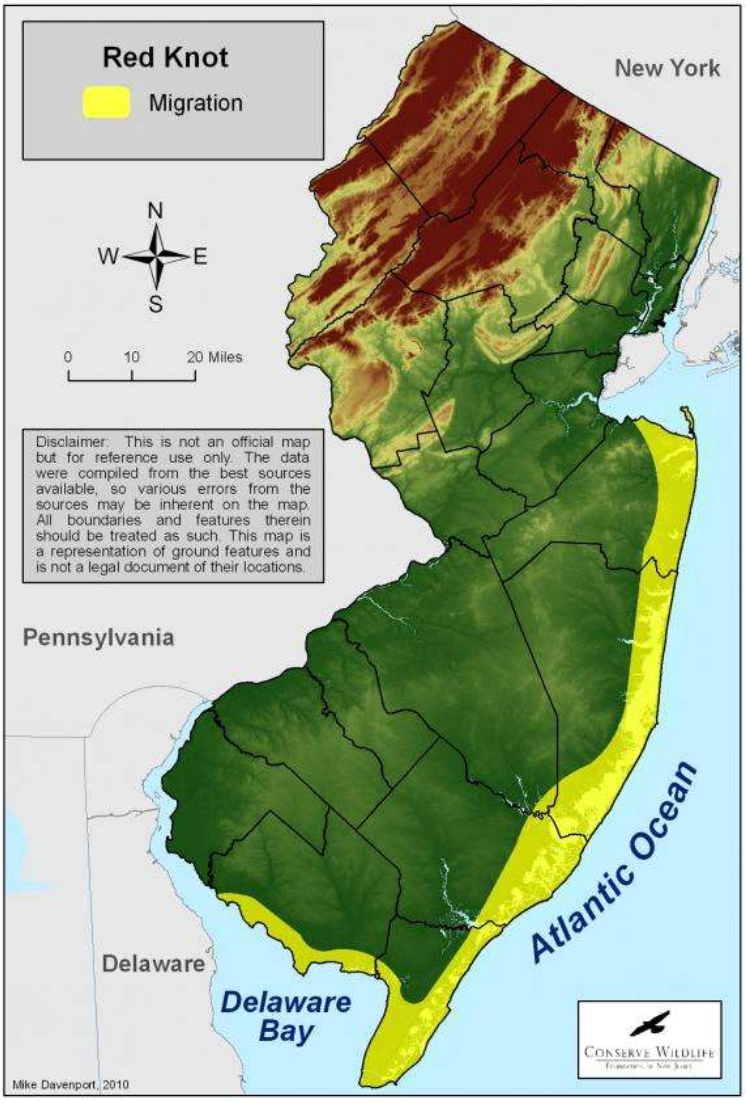
Abundance: Uncommon

Trend: Stable

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Beach and Dune	X
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
	x	x			

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Andres, B.A., P.A. Smith, R.I.G. Morrison, C.L. Gratto-Trevor, S.C. Borwn and C. A. Friis. 2012. Population estimates of North American shorebirds, 2012. Wader Study Group Bull. 119(3):178-194.	☑	☑	☐
Dey, A. 2015. Red Knot Conservation and Management. Report NJ W-70-R-1. New Jersey Dept. of Environmental Protection, Division of Fish and Wildlife, Endangered and Nongame Species Program. Trenton, N.J.	☑	☑	☐
Clark, K.E., and L.J. Niles. 2000. Northern Atlantic Regional Shorebird Plan, Version 1.0. New Jersey Division of Fish and Wildlife, Woodbine, New Jersey. 29 pp. Available from http://www.shorebirdplan.org/wp-content/uploads/2013/01/NATLAN4.pdf (accessed February 2016).	☐	☐	☑
Niles, L.J., J. Bart, H.P. Sitters, A.D. Dey, K.E. Clark, P.W. Atkinson, A.J. Baker, K.A. Bennett, K.S. Kalasz, N.A. Clark, J. Clark, S. Gillings, A.S. Gates, P.M. Gonzalez, D.E. Hernandez, C.D.T. Minton, R.I.G. Morrison, R.R. Porter, R.K. Ross, and C.R. Veitch. 2009. Effects of Horseshoe Crab Harvest in Delaware Bay on Red Knots: Are Harvest Restrictions Working? Bioscience 59:153-164.	☑	☑	☐
Winn, B., S. Brown, C. Spiegel, D. Reynolds, and S. Johnston. Atlantic Flyway Shorebird Business Strategy: A Call To Action, Phase I. February 2013, 28 pp.	☐	☐	☑

Red-headed Woodpecker

Melanerpes erythrocephalus

The Red-headed Woodpecker is a medium-sized woodpecker with a large round head, stiff tail, and thin sharp bill. Adults have red heads (including face and neck), black backs, large white wing patches, and white bellies. Immatures have brown heads, a black row of spots on their white wing patches, and gray streaks on their chests. This cavity-nester is a resident of forests that are sparse, generally 20% to 50% canopy density, with low understory. The temporary nature of this habitat type makes this species vulnerable, although proper and targeted forest management can be beneficial. This species can be found statewide and tends to prefer hardwood forest over pines for its nesting areas.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Birds

Taxa Sub Group: Landbirds

Species Group:

Guild Group: Forest Birds

Conservation Target: Red-headed Woodpecker

Conservation Status

State: T/T

S_Rank: S2B,S2N

Federal:

G_Rank: G5

Population Status

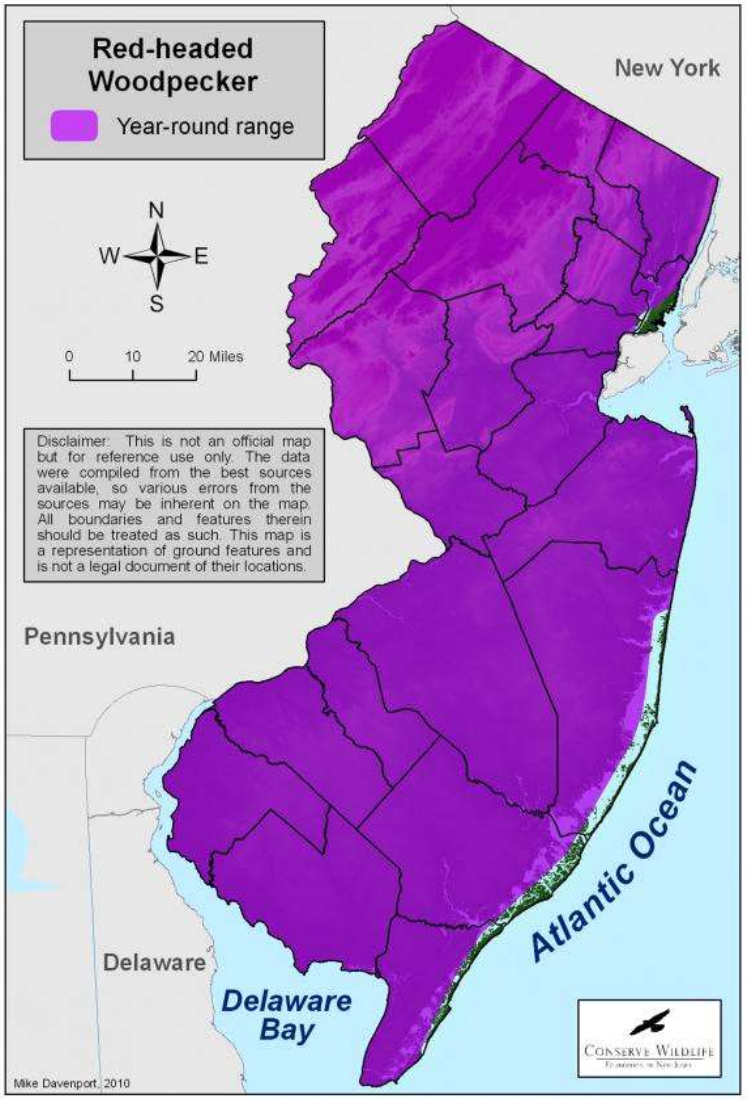
Abundance: Extremely Rare

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Forest	X
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
	x	x	x	x	x

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☐	☐
U.S. Fish and Wildlife Service. 2008. Birds of Conservation Concern 2008. U.S. Department of Interior, Fish and Wildlife Service, Division of Migratory Bird Management. Arlington, V.A. 85 pp. Available from http://www.fws.gov/ (accessed February 2016).	☐	☐	☑
The IUCN Red List of Threatened Species. Version 2015-4. Available from www.iucnredlist.org (accessed February 2016).	☐	☐	☑
Sauer, J.R., J.E. Hines, J.E. Fallon, K.L. Pardieck, D.J. Ziolkowski, Jr., and W.A. Link. 2014. The North American Breeding Bird Survey, Results and Analysis 1966 - 2013. Version 01.30.2015. USGS Patuxent Wildlife Research Center. Laurel, M.D.	☐	☑	☐
Partners in Flight Science Committee. 2013. Population Estimates Database, version 2013. Available from http://rmbo.org/pifpopestimates (accessed February 2016).	☑	☐	☐
Terwilliger Consulting, Inc. and the Northeast Fish and Wildlife Diversity Technical Committee. 2013. Taking Action Together: Northeast Regional Synthesis for State Wildlife Action Plans. A report submitted to the Northeast Fish and Wildlife Diversity Committee. Locustville, VA. 223 pp. Available from http://rcngrants.org/sites/default/files/final_reports/Northeast%20Regional%20Conservation%20Synthesis_September2015.docx (accessed October 2015).	☐	☐	☑

Rosenberg, K.V., J.A. Kennedy, R. Dettmers, R.P. Ford, D. Reynolds, J.D. Alexander, C.J. Beardmore, P.J. Blancher, R.E. Bogart, G.S. Butcher, A.F. Camfield, A. Couturier, D.W. Demarest, W.E. Easton, J.J. Giocomo, R.H. Keller, A.E. Mini, A.O. Panjabi, D.N. Pashley, T.D. Rich, J.M. Ruth, H. Stabins, J. Stanton, T. Will. 2016. Partners in Flight Landbird Conservation Plan: 2016 Revision for Canada and Continental United States. Partners in Flight Science Committee.	☐	☑	☑

Ruddy Turnstone

Arenaria interpres

The Ruddy Turnstone is a shorebird found in NJ primarily during its spring stopover on Delaware Bay, migrating between Central and South American wintering sites and Arctic nesting areas. In May to early June, Ruddy Turnstones and six other migrant shorebird species concentrate on Delaware Bay beaches to take advantage of high densities of spawning horseshoe crabs and crab eggs. Fat-rich crab eggs allow birds to make large, rapid weight gains, important for survival and reproduction. In late summer/early fall, Ruddy Turnstones stop on the Atlantic coast of NJ and other eastern US States to fatten before making non-stop, trans-ocean flights to Central and South America. Recent unpublished surveys of major wintering areas in northern Brazil indicate this species has substantively declined. Its long migration and limited number of quality stopover sites make Ruddy Turnstones vulnerable to disruption of critical resources, catastrophic events, and sea-level rise.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Birds

Taxa Sub Group: Waterbirds

Species Group:

Guild Group: Migrant shorebirds

Conservation Target: Migrant Shorebirds

Conservation Status

State: S

S_Rank: S4N

Federal:

G_Rank: G5

Population Status

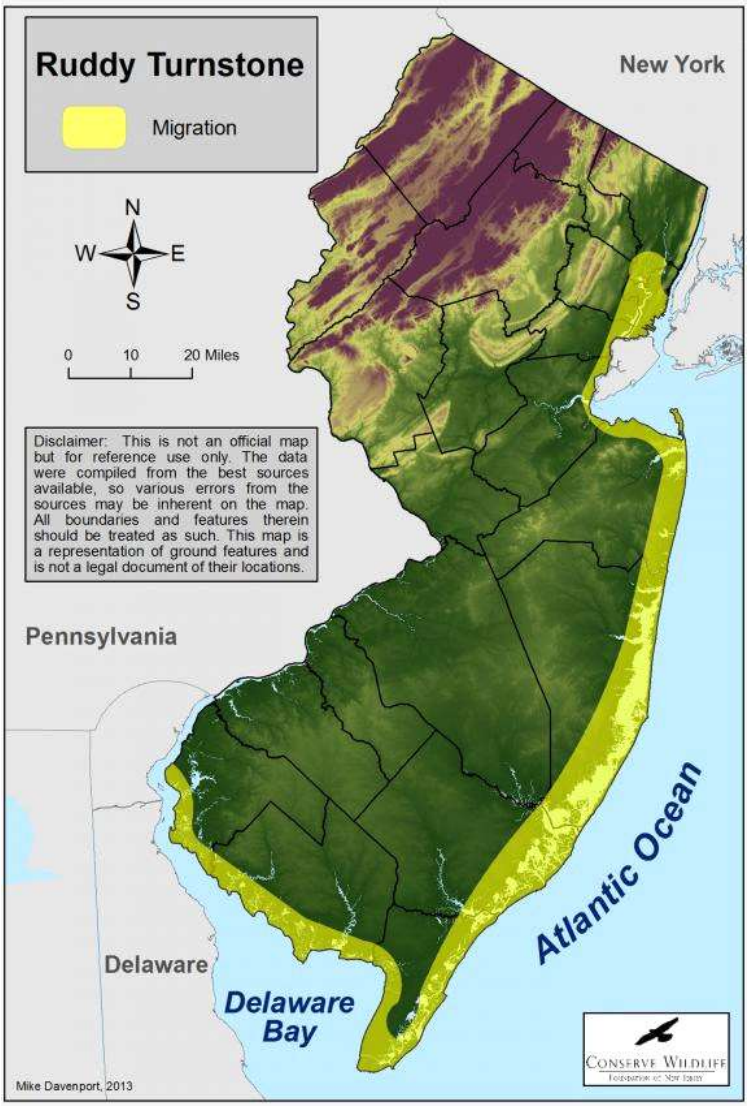
Abundance: Uncommon

Trend: Stable

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Beach and Dune	X
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
	x	x			

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Andres, B.A., P.A. Smith, R.I.G. Morrison, C.L. Gratto-Trevor, S.C. Borwn and C. A. Friis. 2012. Population estimates of North American shorebirds, 2012. Wader Study Group Bull. 119(3):178-194.	☑	☑	☐
Dey, A. 2014. Shorebird Conservation and Management. Report NJ T-1-7. New Jersey Dept. of Environmental Protection, Division of Fish and Wildlife, Endangered and Nongame Species Program. Trenton, N.J.	☑	☑	☐
Clark, K.E., and L.J. Niles. 2000. Northern Atlantic Regional Shorebird Plan, Version 1.0. New Jersey Division of Fish and Wildlife, Woodbine, New Jersey. 29 pp. Available from http://www.shorebirdplan.org/wp-content/uploads/2013/01/NATLAN4.pdf (accessed February 2016).	☐	☐	☑
Niles, L.J., J. Bart, H.P. Sitters, A.D. Dey, K.E. Clark, P.W. Atkinson, A.J. Baker, K.A. Bennett, K.S. Kalasz, N.A. Clark, J. Clark, S. Gillings, A.S. Gates, P.M. Gonzalez, D.E. Hernandez, C.D.T. Minton, R.I.G. Morrison, R.R. Porter, R.K. Ross, and C.R. Veitch. 2009. Effects of Horseshoe Crab Harvest in Delaware Bay on Red Knots: Are Harvest Restrictions Working? Bioscience 59:153-164.	☑	☑	☐
Winn, B., S. Brown, C. Spiegel, D. Reynolds, and S. Johnston. Atlantic Flyway Shorebird Business Strategy: A Call To Action, Phase I. February 2013, 28 pp.	☐	☐	☑

Scarlet Tanager

Piranga olivacea

The Scarlet Tanager is a medium-sized Neotropical migrant songbird that breeds in a variety of deciduous and mixed forests. Adult breeding males are bright red with black wings and tail; adult non-breeding males are olive-yellow with black wings and tail. Females and immatures are olive yellow with olive wings and tail. This species nests in multi-layered woods of intermediate to old age and reproduces most successfully in large tracts of mature forest (>60 years old). Like many other mature forest birds, scarlet tanagers are sensitive to the effects of agriculture and development, but utilize young forest after the nesting period. Proper and targeted forest management can be beneficial for this species.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Birds

Taxa Sub Group: Landbirds

Species Group:

Guild Group: Forest Birds

Conservation Target: Forest Birds

Conservation Status

State: S/S

S_Rank: S4B,S4N

Federal:

G_Rank: G5

Population Status

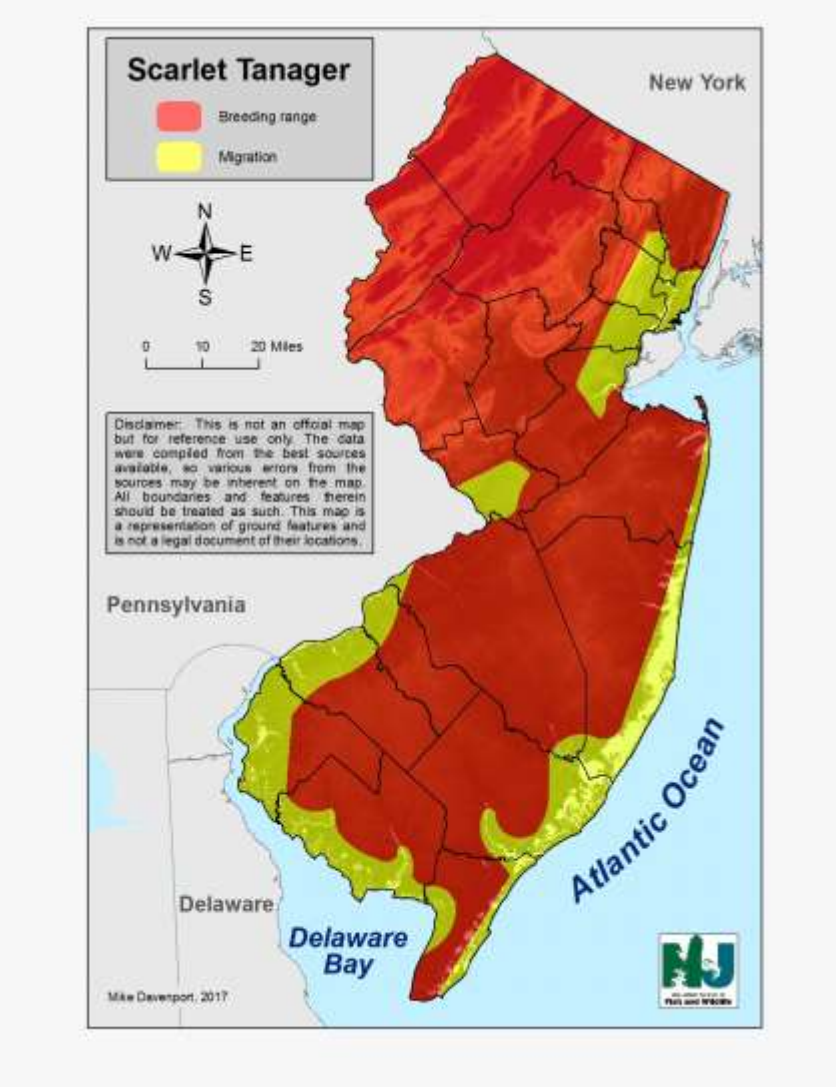
Abundance: Common

Trend: Stable

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Forest	X
Shrub	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
	x	x	x	x	x

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Partners in Flight Science Committee. 2013. Population Estimates Database, version 2013. Available from http://rmbo.org/pifpopestimates (accessed February 2016).	☑	☐	☐
Sauer, J.R., J.E. Hines, J.E. Fallon, K.L. Pardieck, D.J. Ziolkowski, Jr., and W.A. Link. 2014. The North American Breeding Bird Survey, Results and Analysis 1966 - 2013. Version 01.30.2015. USGS Patuxent Wildlife Research Center. Laurel, M.D.	☐	☑	☐
Terwilliger Consulting, Inc. and the Northeast Fish and Wildlife Diversity Technical Committee. 2013. Taking Action Together: Northeast Regional Synthesis for State Wildlife Action Plans. A report submitted to the Northeast Fish and Wildlife Diversity Committee. Locustville, VA. 223 pp. Available from http://rcngrants.org/sites/default/files/final_reports/Northeast%20Regional%20Conservation%20Synthesis_September2015.docx (accessed October 2015).	☐	☐	☑
Steinkamp, M. 2008. New England/Mid-Atlantic Coast Bird Conservation Region (BCR 30) Implementation Plan. U.S. Department of Interior, Fish and Wildlife Service, Northeast Regional Office. Hadley, M.A. 251 pp.	☐	☐	☑
Rosenberg, K.V., J.A. Kennedy, R. Dettmers, R.P. Ford, D. Reynolds, J.D. Alexander, C.J. Beardmore, P.J. Blancher, R.E. Bogart, G.S. Butcher, A.F. Camfield, A. Couturier, D.W. Demarest, W.E. Easton, J.J. Giocomo, R.H. Keller, A.E. Mini, A.O. Panjabi, D.N. Pashley, T.D. Rich, J.M. Ruth, H. Stabins, J. Stanton, T. Will. 2016. Partners in Flight Landbird Conservation Plan: 2016 Revision for Canada and Continental United States. Partners in Flight Science Committee.	☐	☑	☑

Snowy Egret

Egretta thula

The Snowy Egret is a medium sized wading bird that nests in mixed colonies (most often with Great Egrets) in scrub-shrub habitat in the Atlantic coastal marshes of NJ. This is one of the species whose population declined due to the millinery trade of the late 1800s. Protections in the early 1900s led to an increase in populations in the US. Today, the impacts of coastal stabilization combined with sea-level rise are the major threats for this species.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Birds

Taxa Sub Group: Waterbirds

Species Group:

Guild Group: Marsh Birds

Conservation Target: Marsh Birds

Conservation Status

State: SC/S

S_Rank: S3B,S4N

Federal:

G_Rank: G5

Population Status

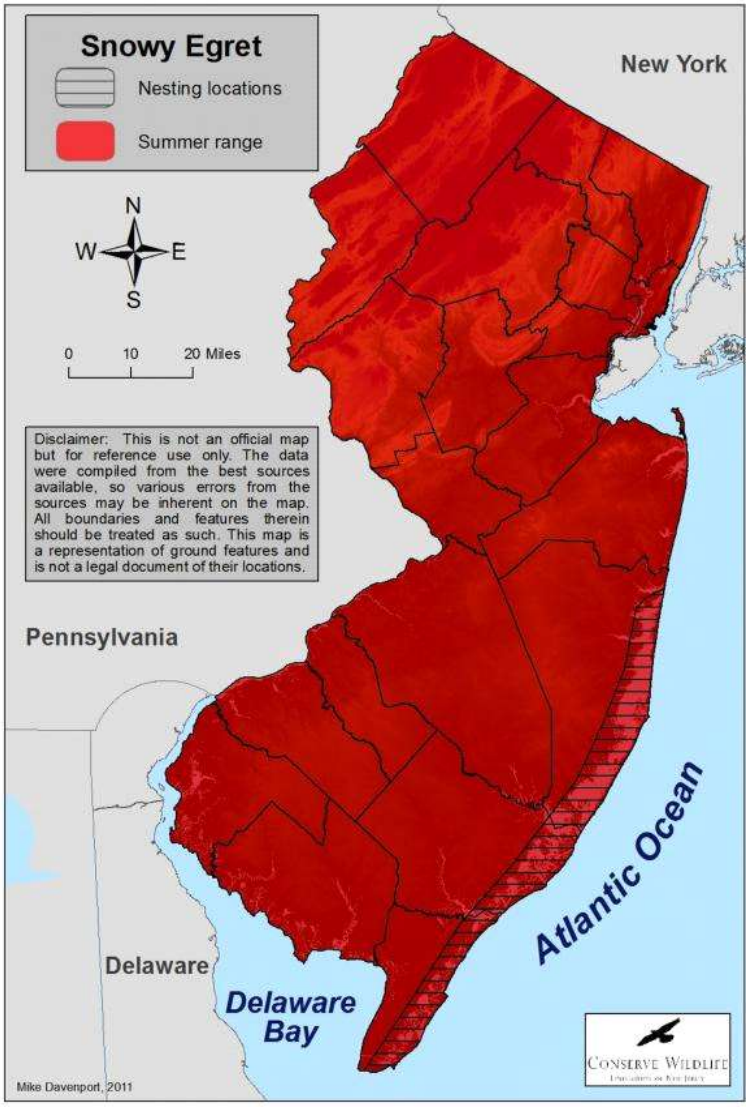
Abundance: Common

Trend: Stable

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
	x	x	x	x	

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Davis, C. 2015. Colonial Waterbird Aerial Survey. Report NJ W-70-R-1. New Jersey Dept. of Environmental Protection, Division of Fish and Wildlife, Endangered and Nongame Species Program. Trenton, N.J.	☑	☑	☐
Kushlan, J.A. et al. 2002. North American Waterbird Conservation Plan. Available from http://www.waterbirdconservation.org/nawcp.html (accessed February 2016).	☐	☐	☑
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☑	☐

Tricolored Heron

Egretta tricolor

The Tricolored Heron was once called Louisiana Heron and this name indicates the location of the majority of the US population (the southern US) for this medium sized wading bird. Its current name is apt, as this bird is white, slate blue and reddish-purple. They nest in mixed species colonies in scrub-shrub habitat in the marshes of Atlantic coastal NJ. They lay 2-7 eggs, incubate for 20-25 days and the chicks can fly by 5 weeks. The impacts of coastal stabilization combined with sea-level rise are major threats for this species.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Birds

Taxa Sub Group: Waterbirds

Species Group:

Guild Group: Marsh Birds

Conservation Target: Marsh Birds

Conservation Status

State: SC/SC

S_Rank: S3B,S3N

Federal:

G_Rank: G5

Population Status

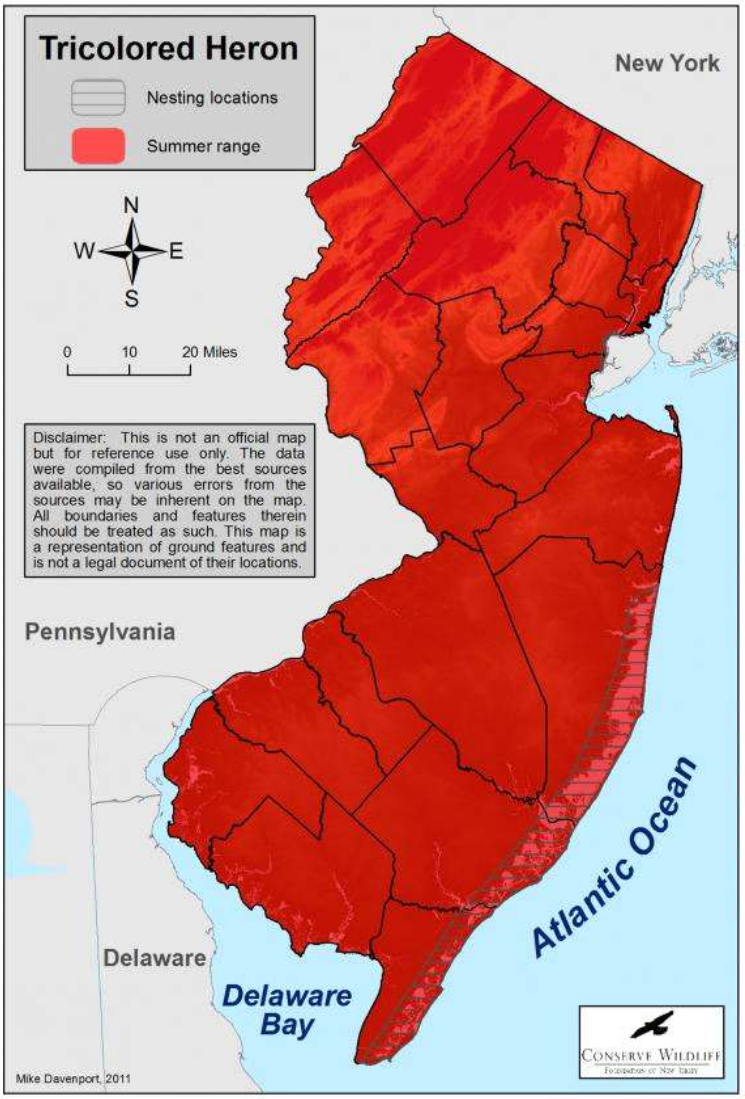
Abundance: Rare

Trend: Stable

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
	x	x	x		

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Davis, C. 2015. Colonial Waterbird Aerial Survey. Report NJ W-70-R-1. New Jersey Dept. of Environmental Protection, Division of Fish and Wildlife, Endangered and Nongame Species Program. Trenton, N.J.	☑	☑	☐
Kushlan, J.A. et al. 2002. North American Waterbird Conservation Plan. Available from http://www.waterbirdconservation.org/nawcp.html (accessed February 2016).	☐	☐	☑
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☑	☐

Vesper Sparrow

Pooecetes gramineus

The Vesper Sparrow is a large, lighter-brown sparrow with fine streaks on its chest, dark markings on its back, and a white eyering. This species nests on the ground in large expanses of early successional/grassland habitat, including hayfields, and is susceptible to impacts from mowing during the nesting season. The temporary nature of early successional/grassland habitat makes this species vulnerable, although proper and targeted management can be beneficial.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Birds

Taxa Sub Group: Landbirds

Species Group:

Guild Group: Grassland Birds

Conservation Target: Grassland Birds

Conservation Status

State: E/SC

S_Rank: S1B,S3N

Federal:

G_Rank: G5

Population Status

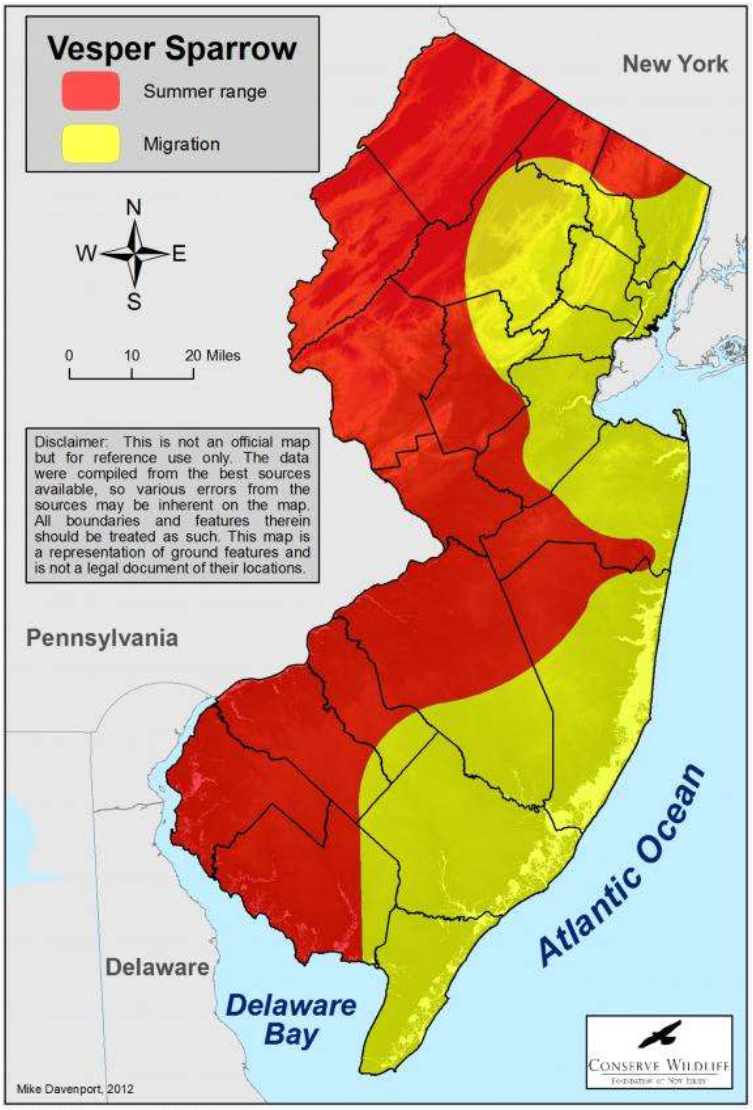
Abundance: Extremely Rare

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Grassland	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
		x	x	x	x

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Partners in Flight Science Committee. 2013. Population Estimates Database, version 2013. Available from http://rmbo.org/pifpopestimates (accessed February 2016).	☑	☐	☐
Rosenberg, K.V., J.A. Kennedy, R. Dettmers, R.P. Ford, D. Reynolds, J.D. Alexander, C.J. Beardmore, P.J. Blancher, R.E. Bogart, G.S. Butcher, A.F. Camfield, A. Couturier, D.W. Demarest, W.E. Easton, J.J. Giocomo, R.H. Keller, A.E. Mini, A.O. Panjabi, D.N. Pashley, T.D. Rich, J.M. Ruth, H. Stabins, J. Stanton, T. Will. 2016. Partners in Flight Landbird Conservation Plan: 2016 Revision for Canada and Continental United States. Partners in Flight Science Committee.	☐	☑	☑
Sauer, J.R., J.E. Hines, J.E. Fallon, K.L. Pardieck, D.J. Ziolkowski, Jr., and W.A. Link. 2014. The North American Breeding Bird Survey, Results and Analysis 1966 - 2013. Version 01.30.2015. USGS Patuxent Wildlife Research Center. Laurel, M.D.	☐	☑	☐
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☐	☐

Wood Thrush

Hylocichla mustelina

The Wood Thrush is a Neotropical migrant songbird that is slightly smaller than a robin with a reddish-brown back, particularly near the nape, white chest with black spots, and white eyering. This species nests in tall shrubs or small trees in deciduous and mixed forests with a well-developed mid-canopy and understory layers. Like many other mature forest birds, the Wood Thrush is sensitive to the effects of agriculture and development, but utilize young forest after the nesting period. Proper and targeted forest management can be beneficial for this species.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Birds

Taxa Sub Group: Landbirds

Species Group:

Guild Group: Forest Birds

Conservation Target: Forest Birds

Conservation Status

State: SC/S

S_Rank: S3B,S4N

Federal:

G_Rank: G5

Population Status

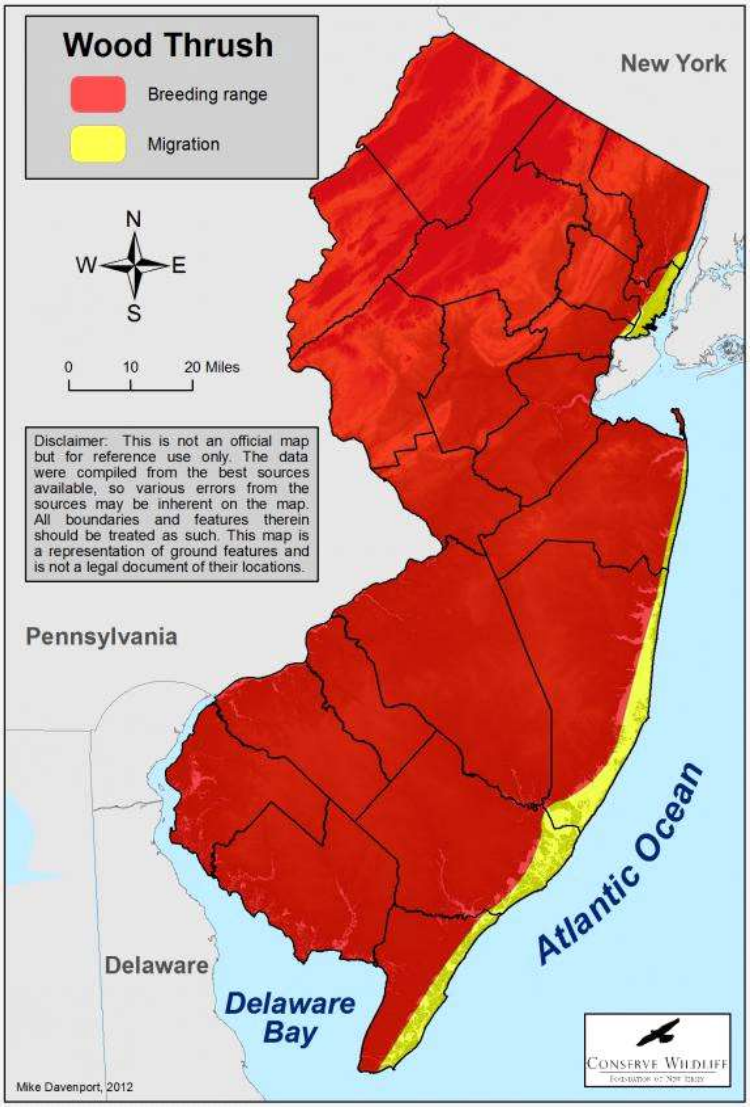
Abundance: Common

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Forest	X
Shrub	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
	x	x	x	x	x

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
U.S. Fish and Wildlife Service. 2008. Birds of Conservation Concern 2008. U.S. Department of Interior, Fish and Wildlife Service, Division of Migratory Bird Management. Arlington, V.A. 85 pp. Available from http://www.fws.gov/ (accessed February 2016).	☐	☐	☑
Partners in Flight Science Committee. 2013. Population Estimates Database, version 2013. Available from http://rmbo.org/pifpopestimates (accessed February 2016).	☑	☐	☐
Steinkamp, M. 2008. New England/Mid-Atlantic Coast Bird Conservation Region (BCR 30) Implementation Plan. U.S. Department of Interior, Fish and Wildlife Service, Northeast Regional Office. Hadley, M.A. 251 pp.	☐	☐	☑
Appalachian Mountains Joint Venture. 2015. Appalachian Mountains Joint Venture 3-year Operational Plan 2015-2018. Available from http://amjv.org/documents/AMJV_2015-18_operational_plan_Approved_June_2015.pdf (accessed February 2016).	☐	☐	☑
Rosenberg, K.V., J.A. Kennedy, R. Dettmers, R.P. Ford, D. Reynolds, J.D. Alexander, C.J. Beardmore, P.J. Blancher, R.E. Bogart, G.S. Butcher, A.F. Camfield, A. Couturier, D.W. Demarest, W.E. Easton, J.J. Giocomo, R.H. Keller, A.E. Mini, A.O. Panjabi, D.N. Pashley, T.D. Rich, J.M. Ruth, H. Stabins, J. Stanton, T. Will. 2016. Partners in Flight Landbird Conservation Plan: 2016 Revision for Canada and Continental United States. Partners in Flight Science Committee.	☐	☑	☑
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☐	☐
Sauer, J.R., J.E. Hines, J.E. Fallon, K.L. Pardieck, D.J. Ziolkowski, Jr., and W.A. Link. 2014. The North American Breeding Bird Survey, Results and Analysis 1966 - 2013. Version 01.30.2015. USGS Patuxent Wildlife Research Center. Laurel, M.D.	☐	☑	☐

Reptiles & Amphibians

Atlantic Green Turtle

Chelonia mydas

The Atlantic Green Turtle is a Federal and State Threatened sea turtle species. From late May until November, NJ coastal waters provide important seasonal foraging habitat. The adults are the only sea turtles that feed exclusively on plants. Nesting in the U.S. is mainly within Florida and Hawaii. They do not nest as far north as New Jersey, although there has been a documented attempt. Green turtle populations are threatened by overharvesting, loss of nesting habitat, interactions with fisheries, entanglement or ingestion of marine debris, oil spills, habitat degradation, beachfront lighting, ocean pollution, dredging, and power plant impingement.

SWAP Classification

Broad Group: Marine Wildlife
Taxon: Reptiles & Amphibians
Taxa Sub Group:
Species Group: Turtles
Guild Group: Marine Turtles
Conservation Target: Marine Turtles

Conservation Status

State: T
S_Rank: S1
Federal:
G_Rank: G3

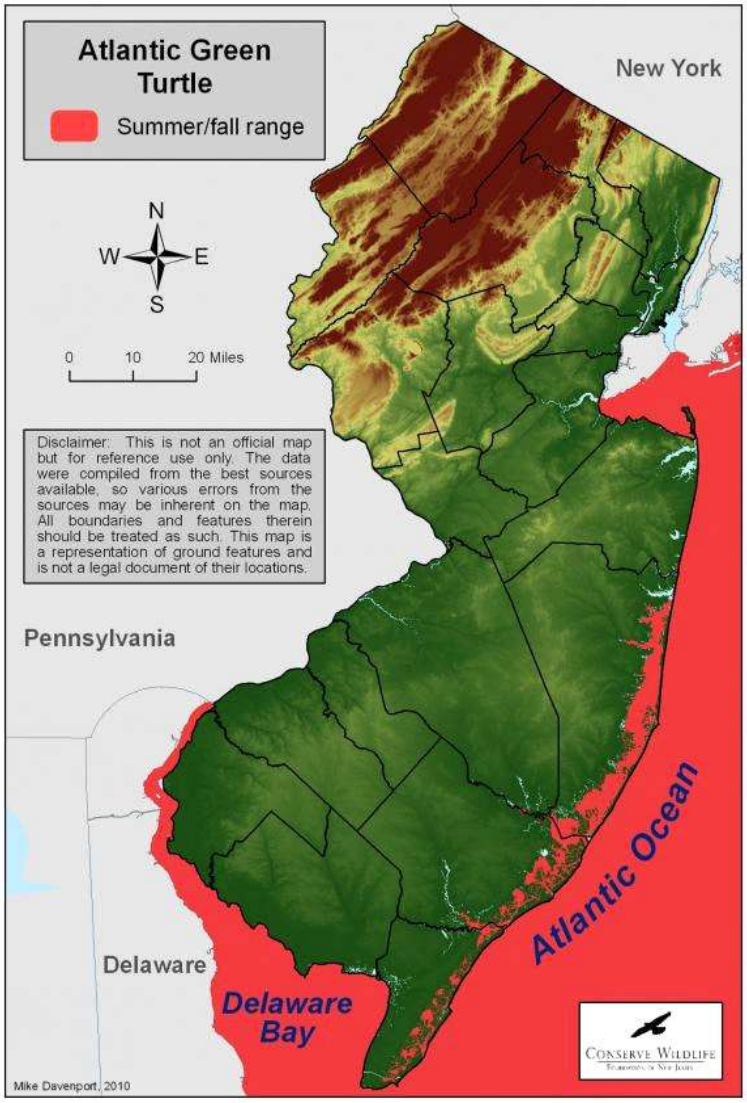
Population Status

Abundance: Extremely Rare
Trend: Increasing

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Marine Nearshore Zone	X
Marine Offshore Zone	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
x	x	x			

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☑	☐
Seminoff, J.A., C.D. Allen, G.H. Balazs, P.H. Dutton, T. Eguchi, H.L. Haas, S.A. Hargrove, M.P. Jensen, D.L. Klemm, A.M. Lauritsen, S.L. MacPherson, P. Opay, E.E. Possardt, S.L. Pultz, E.E. Seney, K.S. Van Houtan, R.S. Waples. 2015. Status Review of the Green Turtle (Chelonia mydas) under the U.S. ESA. NOAA Technical Memorandum, NOAA-NMFS-SWFSC-539. 571 pp.	☑	☑	☐
National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1991. Recovery Plan for the US Population of Atlantic Green Turtle. NMFS. Washington, D.C. Available from http://www.nmfs.noaa.gov/pr/pdfs/recovery/turtle_green_atlantic.pdf (accessed January 2016).	☑	☑	☑
National Marine Fisheries Service. 2015. Atlantic Green Turtle, NOAA Office of Protected Resources, Silver Spring, MD. Available from http://www.nmfs.noaa.gov/pr/species/turtles/green.htm (accessed January 2016).	☑	☑	☐

Atlantic Leatherback

Dermochelys coriacea

The Atlantic Leatherback is a Federal and State Endangered sea turtle species. It is the largest living reptile species in the world. Leatherbacks have the widest global distribution of all sea turtle species. Due to thermoregulatory adaptations, Leatherbacks are able to maintain a higher body temperature, thereby allowing them to tolerate colder waters. New Jersey's coastal waters provide foraging habitat between May and November, where turtles feed almost exclusively on jellyfish. In the US, nesting occurs in the Caribbean and SE Florida. Threats to Leatherbacks include overharvesting, entanglement in fishing gear, dredging, ingestion of marine debris, and habitat loss and degradation.

SWAP Classification

Broad Group: Marine Wildlife

Taxon: Reptiles & Amphibians

Taxa Sub Group:

Species Group: Turtles

Guild Group: Marine Turtles

Conservation Target: Marine Turtles

Conservation Status

State: E

S_Rank: S1

Federal:

G_Rank: G2

Population Status

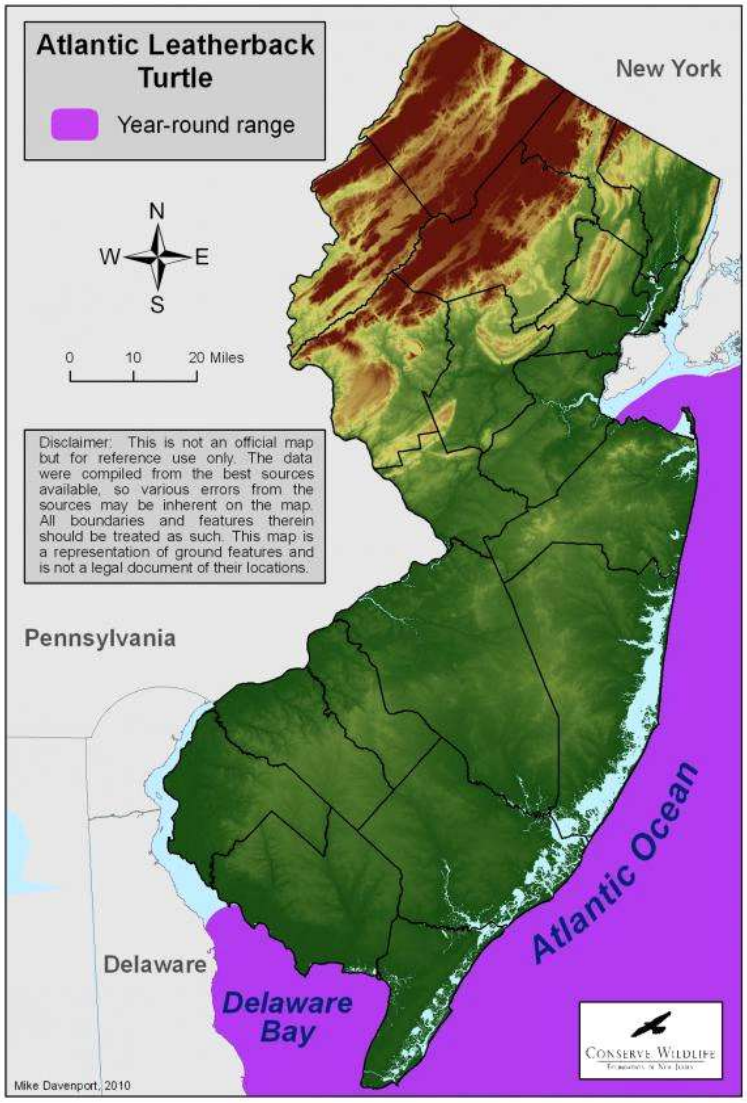
Abundance: Extremely Rare

Trend: Increasing

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Marine Nearshore Zone	X
Marine Offshore Zone	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
x	x				

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☑	☐
National Marine Fisheries Service. 2015. Leatherback Turtle. NOAA Office of Protected Resources, Silver Spring, MD. Available from http://www.nmfs.noaa.gov/pr/species/turtles/leatherback.htm (accessed January 2016).	☑	☑	☐
National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1992. Recovery Plan for Leatherback Turtles in US Caribbean, Atlantic and Gulf of Mexico. NMFS. Washington, D.C. Available from http://www.nmfs.noaa.gov/pr/pdfs/recovery/turtle_leatherback_atlantic.pdf (accessed January 2016).	☑	☑	☑
National Marine Fisheries Service and U.S. Fish and Wildlife Service. 2013. Leatherback Sea Turtle (Dermochelys coriacea) 5 year Review: Summary and Evaluation. Available from http://www.nmfs.noaa.gov/pr/listing/5yearreview_leatherbackturtle.pdf (accessed January 2016).	☑	☑	☐

Atlantic Loggerhead

Caretta caretta

The Atlantic Loggerhead turtle is a Federal Threatened and State Endangered sea turtle species. In New Jersey, it has been recorded in the Atlantic Ocean as well as in the Barnegat, Delaware, and Raritan bays, usually between the months of May to November. Their large heads contain powerful crushing jaws with which they feed on crabs and other shellfish. Along the U.S. Atlantic Coast, the major nesting areas range from Florida to North Carolina. Loggerhead populations have declined due to overharvesting and loss of nesting habitat. Entanglement in fishing nets or marine debris, and ingestion of marine debris represent the most serious threats to their existence and recovery.

SWAP Classification

Broad Group: Marine Wildlife

Taxon: Reptiles & Amphibians

Taxa Sub Group:

Species Group: Turtles

Guild Group: Marine Turtles

Conservation Target: Marine Turtles

Conservation Status

State: E

S_Rank: S1

Federal:

G_Rank: G3

Population Status

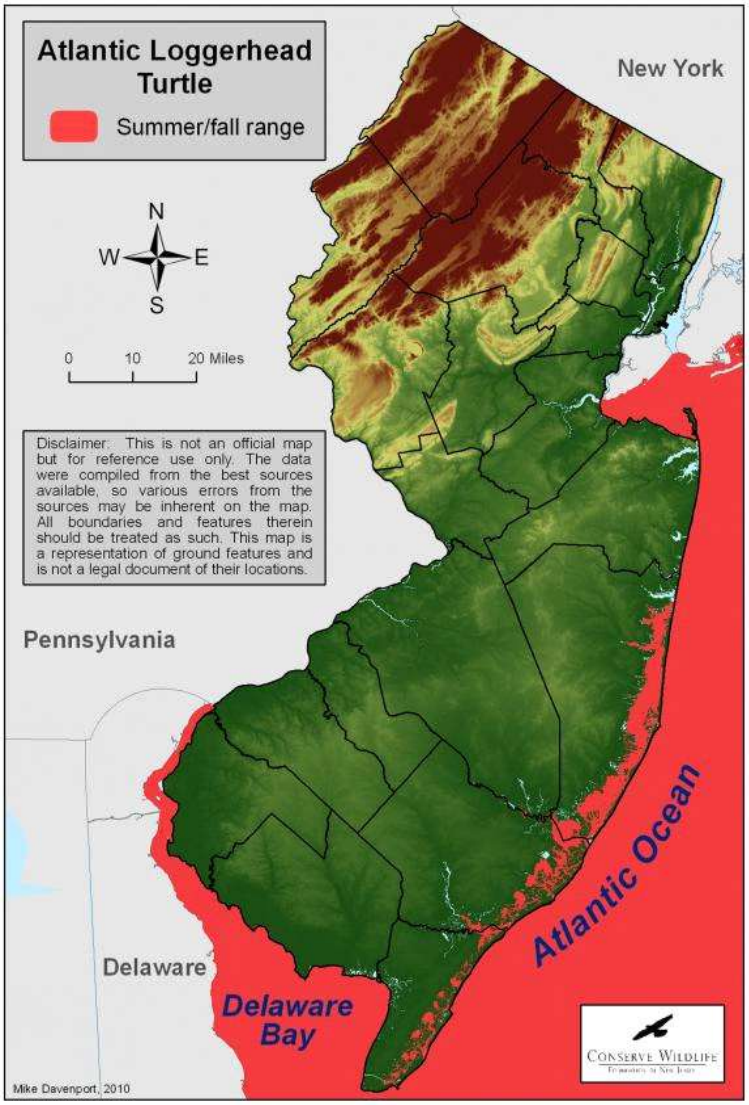
Abundance: Extremely Rare

Trend: Increasing

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Marine Nearshore Zone	X
Marine Offshore Zone	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
x	x	x			

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
National Marine Fisheries Service. 2014. Atlantic Loggerhead. NOAA Office of Protected Resources, Silver Spring, MD. Available from http://www.nmfs.noaa.gov/pr/species/turtles/loggerhead.htm (accessed January 2016).	☑	☑	☐
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☑	☐
National Marine Fisheries Service and U.S. Fish and Wildlife Service. 2008. Recovery Plan for the NW Atlantic Population of the Loggerhead Sea Turtle (Caretta caretta), Second Revision. NMFS. Silver Spring, M.D. Available from http://www.nmfs.noaa.gov/pr/pdfs/recovery/ (accessed January 2016).	☑	☑	☑
Turtle Expert Working Group. 2009. An Assessment of the Loggerhead Turtle Population in the Western North Atlantic Ocean. NOAA Technical Memorandum NMFS-SEFSC-575. 131p. Available from http://www.sefsc.noaa.gov/turtles/TM_575_TEWG.pdf (accessed January 2016).	☑	☑	☐

Atlantic Ridley

Lepidochelys kempii

The Atlantic (Kemp's) Ridley is a Federal and State Endangered species. It is the smallest marine turtle in the world. From late May until November, Kemp's Ridleys forage on crabs, fish, jellyfish, and mollusks in NJ's coastal waterways. Nearly 95% of nesting activity occurs within the state of Tamaulipas, Mexico. They do not nest as far north as New Jersey. Current threats include exploitation for food, entanglement in fishing gear, oil spills, habitat degradation, beachfront lighting, ocean pollution (including marine debris, which may be ingested), dredging, collisions with boats, and power plant impingement.

SWAP Classification

Broad Group: Marine Wildlife

Taxon: Reptiles & Amphibians

Taxa Sub Group:

Species Group: Turtles

Guild Group: Marine Turtles

Conservation Target: Marine Turtles

Conservation Status

State: E

S_Rank: S1

Federal:

G_Rank: G1

Population Status

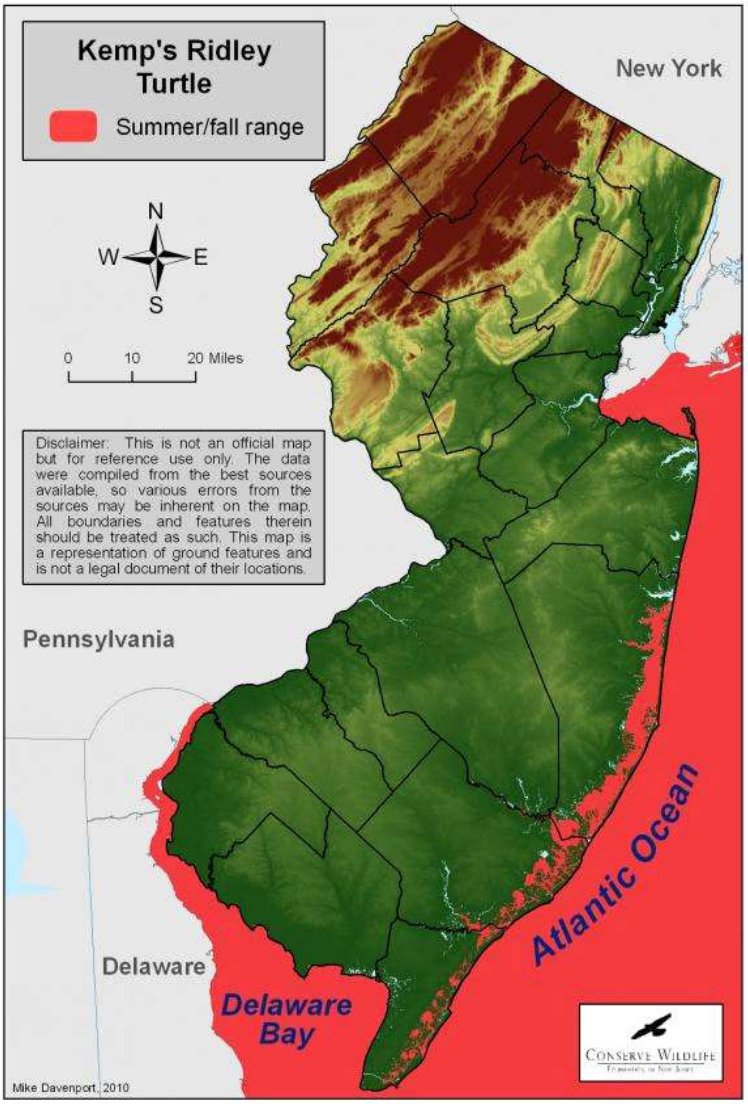
Abundance: Extremely Rare

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Marine Nearshore Zone	X
Marine Offshore Zone	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
x	x	x			

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
National Marine Fisheries Service and U.S. Fish and Wildlife Service. 2015. Kemp's Ridley Sea Turtle 5 Year Review: Summary and Evaluation. Available from http://www.nmfs.noaa.gov/pr/listing/final_july_2015_kemp_s_5_year_review.pdf (accessed January 2016).	☑	☑	☐
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☑	☐
National Marine Fisheries Service. 2015. Kemp's Ridley Turtle. NOAA Office of Protected Resources, Silver Spring, MD. Available from http://www.nmfs.noaa.gov/pr/species/turtles/kempsridley.htm (accessed January 2016).	☑	☑	☐
National Marine Fisheries Service, U.S. Fish and Wildlife Service, and SEMERNAT. 2011. Bi-national Recovery Plan for the Kemp's Ridley Sea Turtle (Lepidochelys kempii), Second Revision. NMFS. Silver Spring, M.D. 156 pp + appendices. Available at http://www.nmfs.noaa.gov/pr/pdfs/recovery/kempsrid (accessed January 2016).	☑	☑	☑

Bog Turtle

Glyptemys muhlenbergii

The Bog Turtle is a small freshwater turtle that inhabits fens, bogs, and wet meadows that are characterized by substrates of mucky, organic soil that is kept saturated by groundwater discharge. The turtle's shell is colored black to a mahogany brown, often with sunburst patterning. A distinctive yellow to orange neck blotch is a distinguishing characteristic. A habitat specialist, the species once occupied much of the suitable habitat in the state's Piedmont and Highlands Valley. Historic wetland loss and current habitat fragmentation and succession of habitat threaten this rare turtle. While wetland dependent, adjacent natural land cover types including forests, scrub-shrub, and grassland habitats may serve as important wetland buffers and be used by the turtles at different times of year.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Reptiles & Amphibians

Taxa Sub Group: Terrestrial Reptiles

Species Group: Turtles

Guild Group:

Conservation Target: Bog Turtle

Conservation Status

State: E

S_Rank: S1

Federal:

G_Rank: G3

Population Status

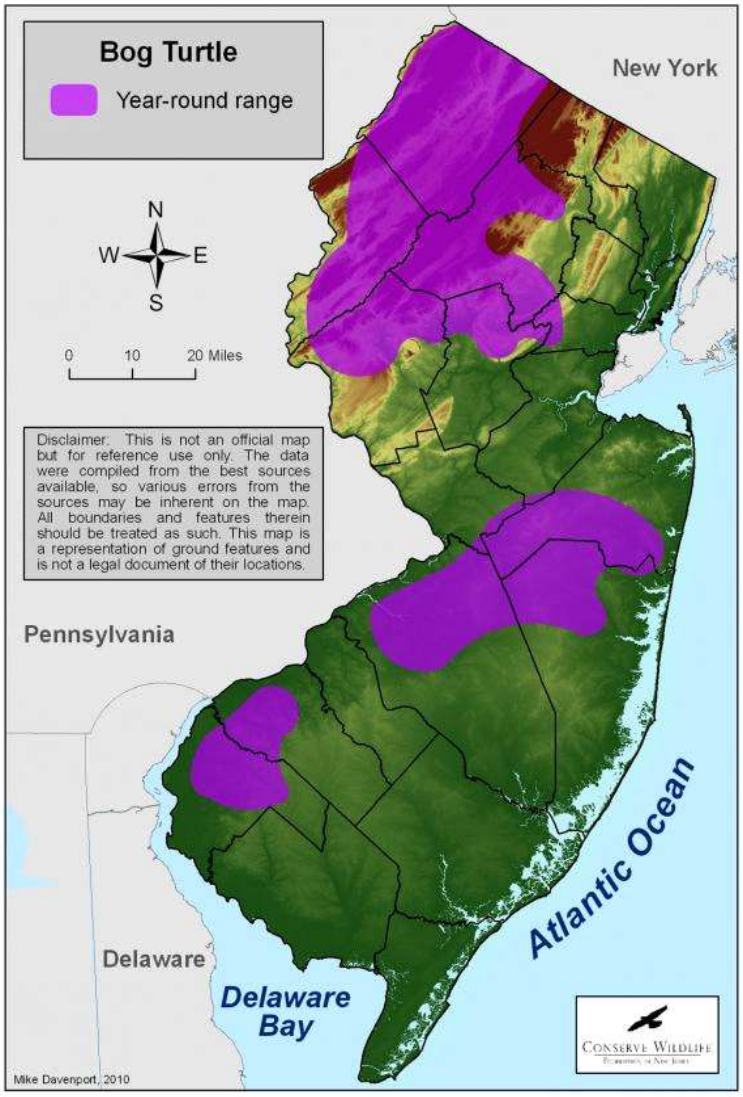
Abundance: Uncommon

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
			x	x	x

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☐	☐
U.S. Fish and Wildlife Service. 2001. Bog Turtle (Clemmys muhlenbergii), Northern population, recovery plan. USFWS, Hadley, M.A. Available from http://www.fws.gov/northeast/nyfo/ebogturtle.pdf	☑	☑	☑
U.S. Fish and Wildlife Service. 2014. Strategic Plan. New York and Long Island Field Offices. Cortland, N.Y. Available from https://www.fws.gov/northeast/nyfo/Full%20report%202014%20Web.pdf	☐	☐	☑
Myers, A.T., and J.P. Gibbs. 2013. Landscape-level factors influencing bog turtle persistence and distribution in southeastern New York State. Journal of Fish and Wildlife Management 4(2):255–266.	☐	☑	☐

Carpenter Frog

Lithobates virgatipes

The Carpenter Frog is sometimes referred to as the sphagnum frog because of its close association with sphagnum bogs. It has a high tolerance for acidic waters and is often found in emergent vegetation of standing or slow moving waters throughout the Coastal Plains physiographic province. It is easily identified by four yellow stripes running lengthwise on a brownish ground color. Its lack of dorsolateral ridges and rhythmic double-tapping call are also key identification characteristics.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Reptiles & Amphibians

Taxa Sub Group: Amphibians

Species Group: Frogs and Toads

Guild Group: Vernal Pond & Pond Breeders

Conservation Target: Vernal Pond & Pond Breeders

Conservation Status

State: SC

S_Rank: S3

Federal:

G_Rank: G5

Population Status

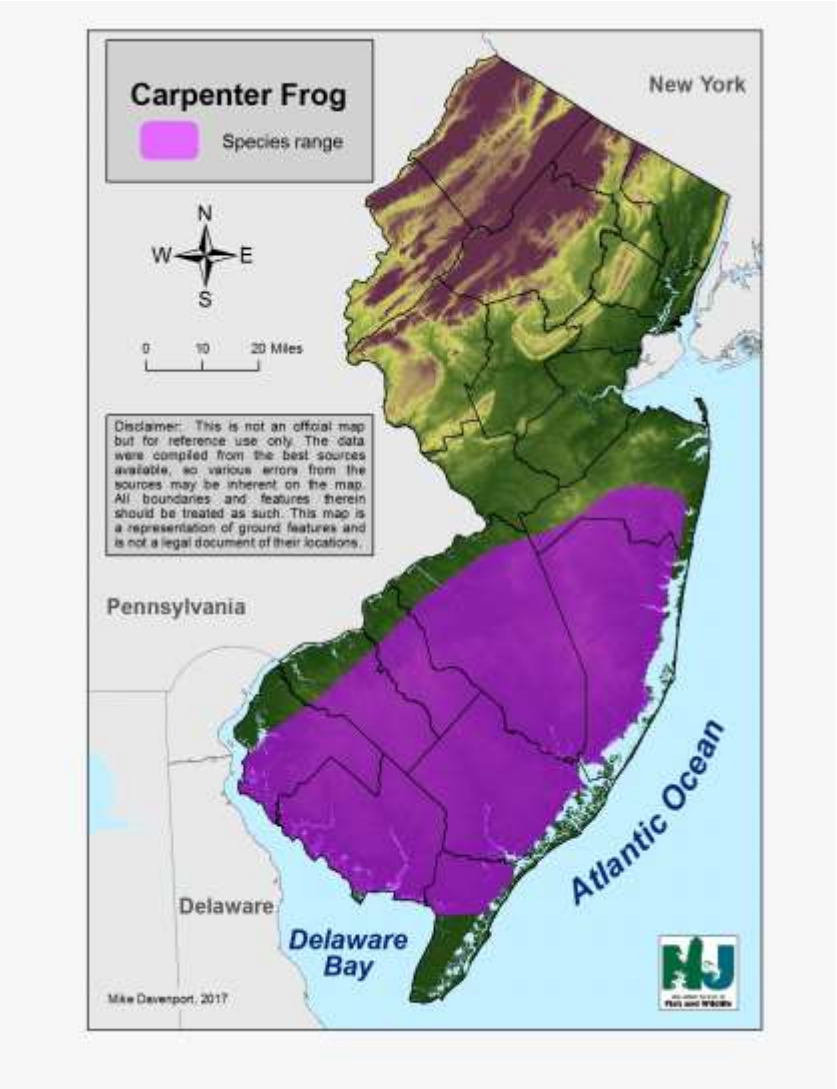
Abundance: Uncommon

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Forest	X
Shrub	X
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
	x	x	x	x	

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☑	☐
Bunnell, J.F., and R.A. Zampella. 2008. Native Fish and Anuran Assemblages Differ between Impoundments with and without Non-Native Centrarchids and Bullfrogs. Copeia, 2008(4):931–939.	☐	☑	☐

Corn Snake

Elaphe guttata guttata

The Corn Snake (Elaphe guttata guttata) is a State Endangered and regionally imperiled species with most of NJ's remaining population limited to the physiographic province, the Pinelands Region, and suitable fringe habitats. It is a mostly semi-fossorial species inhabiting a variety of habitats ranging from mature, upland pine and pine-oak forests with uprooted trees, stumps and logs, and open grassy fields and/or sandy and/or loamy areas within and adjacent to the forests. This snake will hibernate below tree stumps while mole tunnels, decaying logs, and tree stumps provide suitable nest habitats for egg laying. This snake shows a strong fidelity to both winter hibernacula and nesting areas, with both often being used repeatedly by the same snake(s). Their foods include rodents, birds and reptiles, but small/younger snakes will primarily rely on lizards and insects.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Reptiles & Amphibians

Taxa Sub Group: Terrestrial Reptiles

Species Group: Snakes

Guild Group: Pine Barrens Snakes

Conservation Target: Pine Barrens Snakes

Conservation Status

State: E

S_Rank: S1

Federal:

G_Rank: G5

Population Status

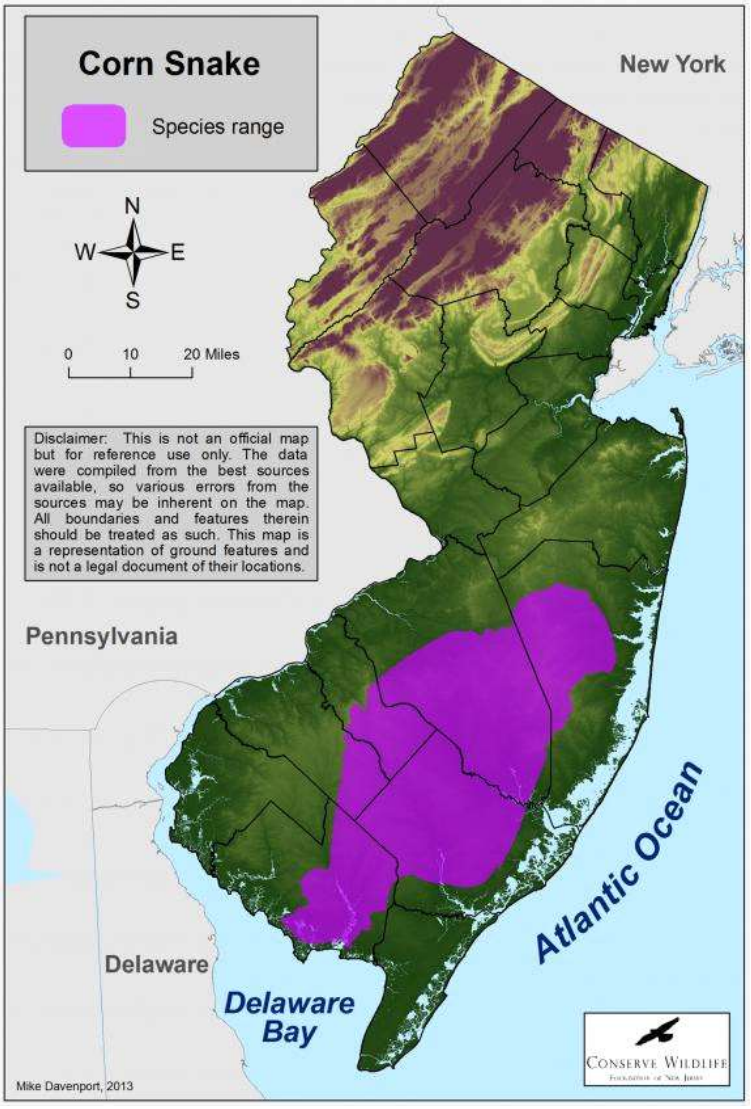
Abundance: Rare

Trend: Unknown

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Forest	X
Shrub	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
	x	x		x	

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
DiLeo, K. 2016. Species Status Review of Amphibian and Reptiles, Results Report for the NJ Endangered and Nongame Species Advisory Committee. New Jersey Dept. of Environmental Protection, Division of Fish and Wildlife. Trenton, N.J.	☑	☐	☐
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☐	☑	☐

Eastern Box Turtle

Terrapene carolina carolina

The combination of the high, domed, weakly keeled carapace, and the hinged plastron that can tightly close front and back, make the Eastern Box Turtle distinct from all other turtles in New Jersey. The carapace and plastron have yellow, orange, olive or tan markings on a brown or black background; different animals may show relatively darker or lighter coloration. The Eastern Box Turtle has a hooked upper jaw, and four toes on each hind foot. A species who occupies a variety of habitat types, and often a familiar backyard visitor, fragmented Piedmont and Highlands populations are in greater jeopardy than those of the Pinelands region, due to upland habitat loss. Pathogens, such as Ranavirus, threaten box turtles statewide.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Reptiles & Amphibians

Taxa Sub Group: Terrestrial Reptiles

Species Group: Turtles

Guild Group:

Conservation Target: Eastern Box Turtle

Conservation Status

State: SC

S_Rank: S3

Federal:

G_Rank: G5T5

Population Status

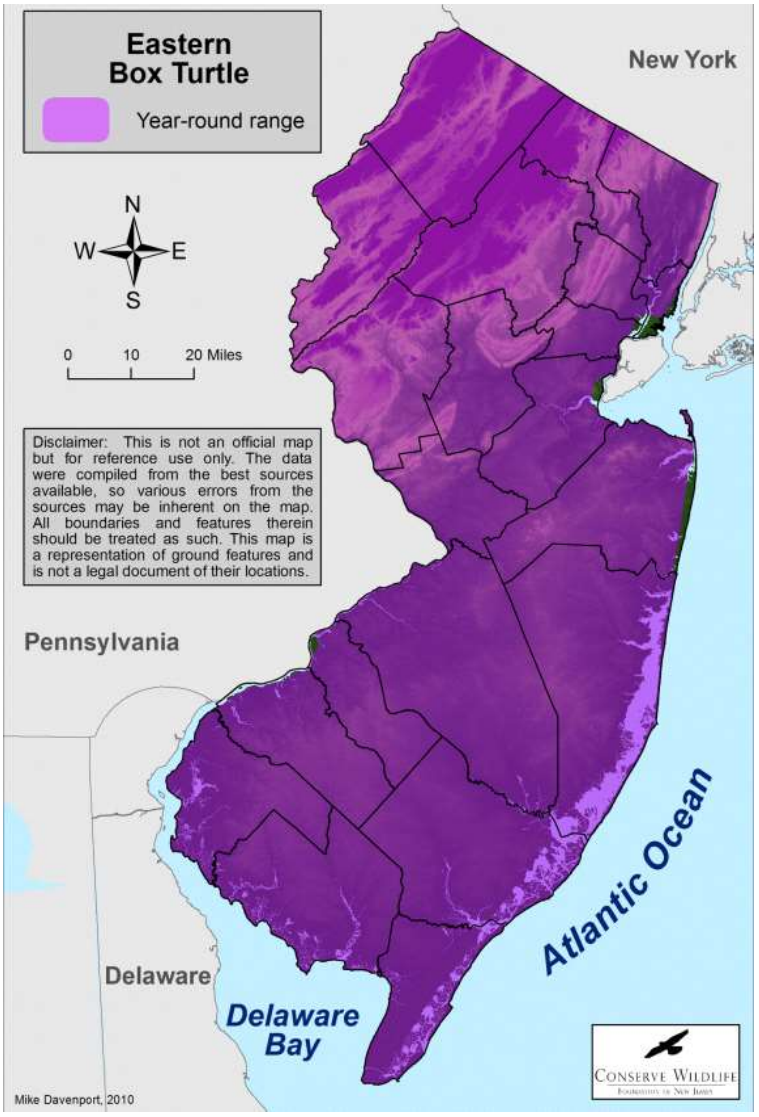
Abundance: Uncommon

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Forest	X
Grassland	X
Shrub	X
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
	x	x	x	x	x

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
New Hampshire Fish and Game Department. 2015. New Hampshire Wildlife Action Plan 2015 Revised Edition, Appendix A: Reptiles. Concord, N.H. Available from http://www.wildlife.state.nh.us/wildlife/documents/wap/appendixa-reptiles.pdf	☐	☐	☑
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☐	☐
Ernst C., J. Lovich, and R. Barbour. 2009. Turtles of the United States and Canada. 2nd edition. The Johns Hopkins University Press, Baltimore. 827pp.	☐	☑	☐
Van Dijk, P.P. 2013. Terrapene carolina. The IUCN Red List of Threatened Species 2013: e.T21641A9303747. Available from http://dx.doi.org/10.2305/IUCN.UK.2011-1.RLTS.T21641A9303747.en (accessed January 2016).	☐	☑	☐
Swarth, C. and S. Hagood. 2004. Summary of the Eastern Box Turtle Regional Conservation Workshop. The Humane Society of the United States. Washington, D.C.	☐	☑	☐

Eastern Hognose Snake

Heterodon platirhinos

The Eastern Hognose Snake (Heterodon platirhinos) is a regionally imperiled species and, although this snake's NJ range is statewide, it is considered uncommon. This snake will inhabit a variety of habitats with a sandy substrate, but can also be found in hardwood, mixed and open pine forests, open fields, and along wetland edges. It is a terrestrial species, spending most of its time above ground rather than concealed under objects or debris. Females lay eggs in depressions within sandy substrates, under logs, and in the soil under and among rocks. Their primary food sources are frogs and toads.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Reptiles & Amphibians

Taxa Sub Group: Terrestrial Reptiles

Species Group: Snakes

Guild Group:

Conservation Target: Eastern Hognose Snake

Conservation Status

State: S

S_Rank: S5

Federal:

G_Rank: G5

Population Status

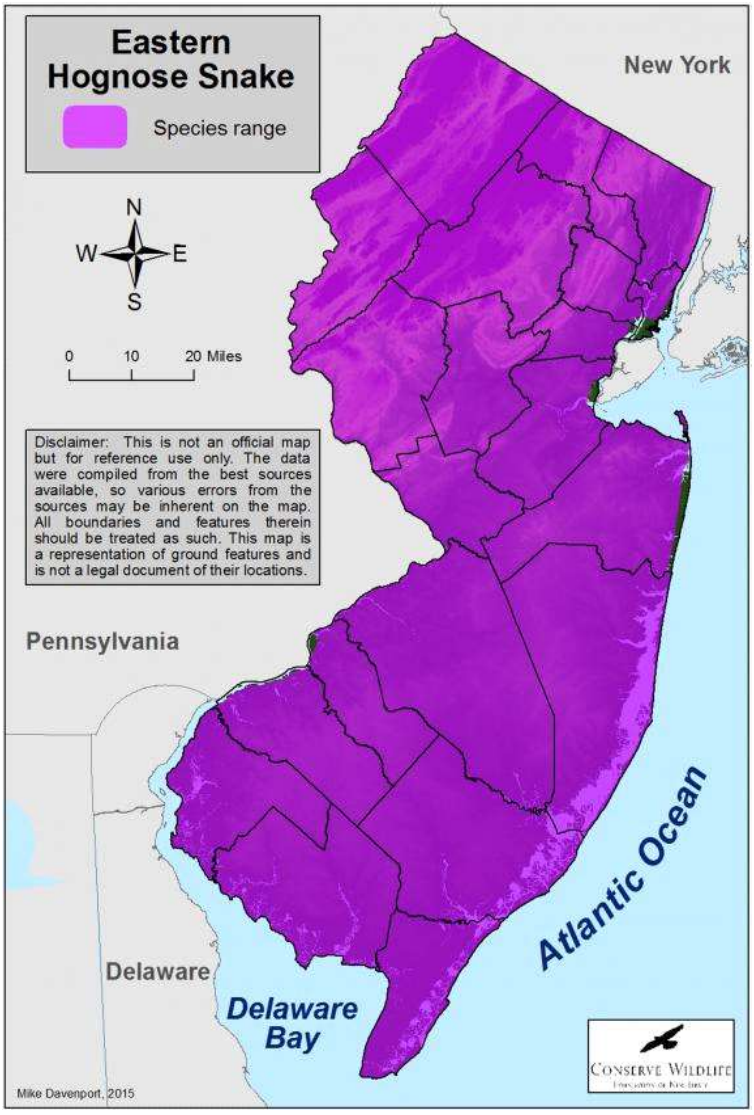
Abundance: Uncommon

Trend: Unknown

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Forest	X
Shrub	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont	InnerCoastal Plains	Pinelands	Skylands
				x	x	x

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Kraus, T. 2011. Recovery Strategy for the Eastern Hog-nosed Snake (Heterodon platirhinos) in Ontario. Ontario Recovery Strategy Series. Prepared for the Ontario Ministry of Natural Resources, Peterborough, Ontario. i + 6 pp + Appendix vi + 24 pp. Adoption of the Recovery Strategy for the Eastern Hog-nosed Snake (Heterodon platirhinos) in Canada (Seburn, 2009). Available from http://files.ontario.ca/environment-and-energy/species-at-risk/stdprod_086030.pdf	☐	☐	☑
DiLeo, K. 2016. Species Status Review of Amphibian and Reptiles, Results Report for the NJ Endangered and Nongame Species Advisory Committee. New Jersey Dept. of Environmental Protection, Division of Fish and Wildlife. Trenton, N.J.	☑	☑	☐

Eastern Redbelly Turtle

Pseudemys rubriventris

The Eastern Redbelly Turtle is the largest native basking turtle in New Jersey. The key identifying characteristics are the red-orange plastron, reddish markings on a dark carapace, and cusps flanking the notch at the tip of the upper jaw. Many large adults, particularly in southern New Jersey, are highly melanistic, but even these may still show some faint reddish markings when wet. The hingeless plastron is often marked with large gray blotches that fade with age. The species appears stable throughout much of its state range, although nesting females and dispersing individuals are threatened by vehicle strikes at road crossings throughout the fragmented landscape. In addition, natural succession of nesting habitat may shift annual movements into less familiar, and potentially more dangerous areas.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Reptiles & Amphibians

Taxa Sub Group: Terrestrial Reptiles

Species Group: Turtles

Guild Group:

Conservation Target: Eastern Redbelly Turtle

Conservation Status

State: U

S_Rank: SU

Federal:

G_Rank: G5

Population Status

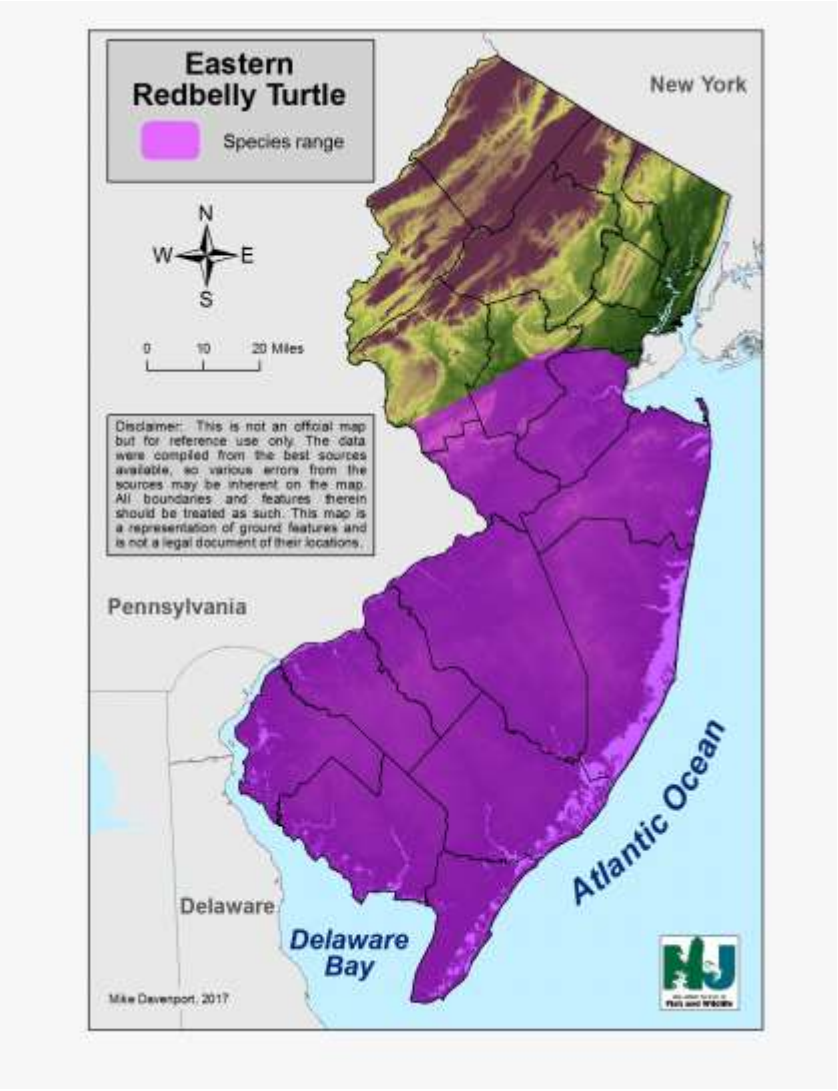
Abundance: Common

Trend: Stable

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Coldwater Stream	X
Grassland	X
Warmwater Stream	X
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
	x	x	x	x	

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
U.S. Fish and Wildlife Service. 2007. Northern Red-Bellied Cooter (Pseudemys rubriventris) 5-Year review: summary and evaluation. New England Field Office. Concord, N.H. Available from https://www.fws.gov/northeast/EcologicalServices/pdf/endangered/NorthernRedBelliedCooter.pdf	☑	☑	☐
Van Dijk, P.P. 2013. Pseudemys rubriventris. The IUCN Red List of Threatened Species 2013: e.T18460A8299690. Available from http://dx.doi.org/10.2305/IUCN.UK.2011-1.RLTS.T18460A8299690.en (accessed January 2016).	☑	☑	☐

Eastern Spadefoot

Scaphiopus holbrookii

The Eastern Spadefoot is the only spadefoot that occurs east of the Mississippi river, and can be found in forests or fields with sandy or loose soil. It is seldom seen, emerging from its burrow only after warm, heavy rains or lengthy wet periods. Two yellowish lines curve down the back from each eye, and the large yellow eyes have a vertical pupil. A defining characteristic is the sharp, arcing spade found on the inner side of each hind foot.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Reptiles & Amphibians

Taxa Sub Group: Amphibians

Species Group: Frogs and Toads

Guild Group: Vernal Pond & Pond Breeders

Conservation Target: Vernal Pond & Pond Breeders

Conservation Status

State: U

S_Rank: SU

Federal:

G_Rank: G5

Population Status

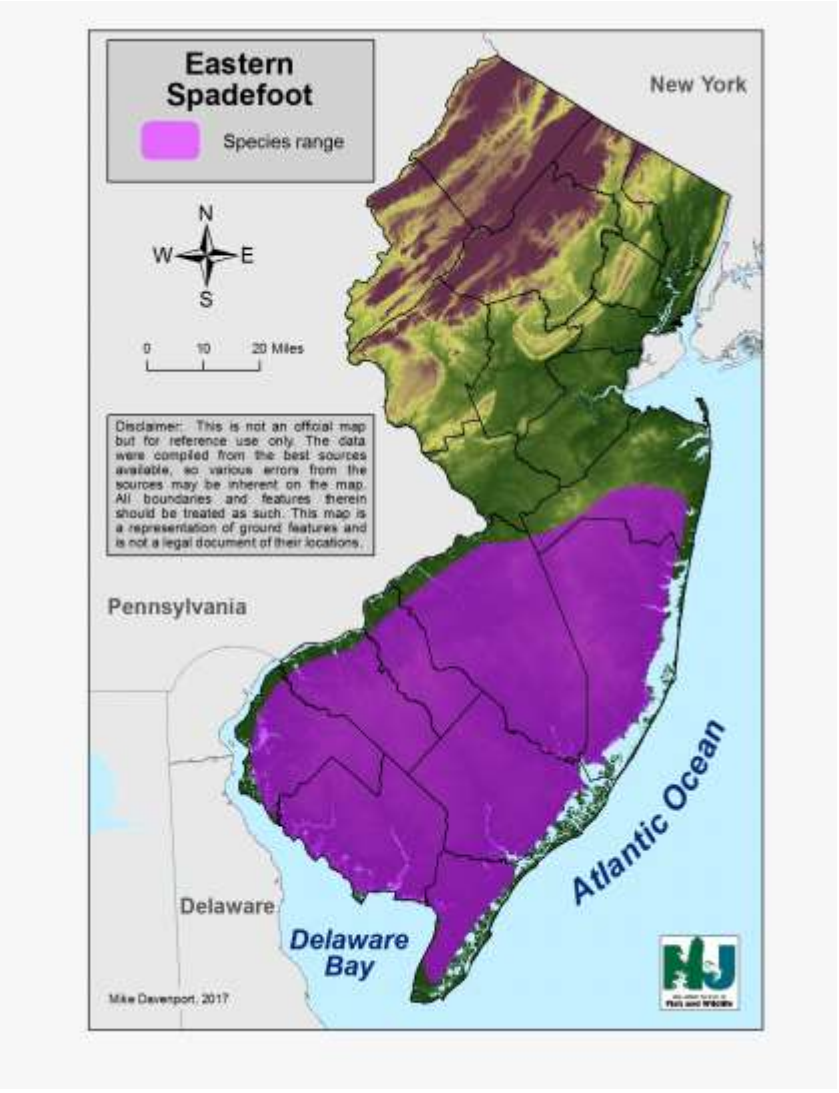
Abundance: Uncommon

Trend: Unknown

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Forest	X
Grassland	X
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
	x	x		x	x

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Lannoo, M. 2005. Amphibian Declines: The Conservation Status of United States Species. Berkeley: University of California Press.	☑	☑	☐
Pennsylvania Fish and Boat Commission. 2011. Species Action Plan: Eastern Spadefoot (Scaphiopus holbrookii). Harrisburg, PA. Available from http://www.fishandboat.com/Resource/SpeciesofSpecialConcern/Documents/species-plan-spadefoot.pdf	☐	☐	☑

Eastern Tiger Salamander

Ambystoma tigrinum tigrinum

The Eastern Tiger Salamander is the largest salamander in New Jersey, belonging to the family "Ambystomatidae," which are commonly referred to as "mole salamanders" due to the fossorial nature of the member species. Juveniles and adults are largely terrestrial and occur within closed canopy deciduous or mixed coniferous-deciduous forests, residing in underground refugia such as abandoned small mammal borrows or under coarse woody debris. Adults emerge only when necessary to forage and to migrate seasonally to fish-free, typically ephemeral breeding areas or vernal ponds. Breeding season migrations occur between November and March. Individual salamanders may migrate as far as 300 meters to reach breeding sites. Fidelity to the natal breeding pool is strong. Over 90% of sexually mature (3-4 year old) individuals return to the pool of their origin to reproduce. Adults are thereafter nearly 100% faithful to their originally selected breeding location. Egg and larval development stages are aquatic, and on average require 4 to 6 months (depending on water temperatures) until juveniles are able to metamorphose and exit the breeding ponds, dispersing widely into adjacent contiguous forests. Drought or premature desiccation of breeding sites can result in compete breeding seasonal failure for a local population. Eastern Tiger Salamanders are New Jersey's most imperiled amphibian.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Reptiles & Amphibians

Taxa Sub Group: Amphibians

Species Group: Salamanders

Guild Group: Vernal Pond & Pond Breeders

Conservation Target: Vernal Pond & Pond Breeders

Conservation Status

State: E

S_Rank: S1

Federal:

G_Rank: G5T5

Population Status

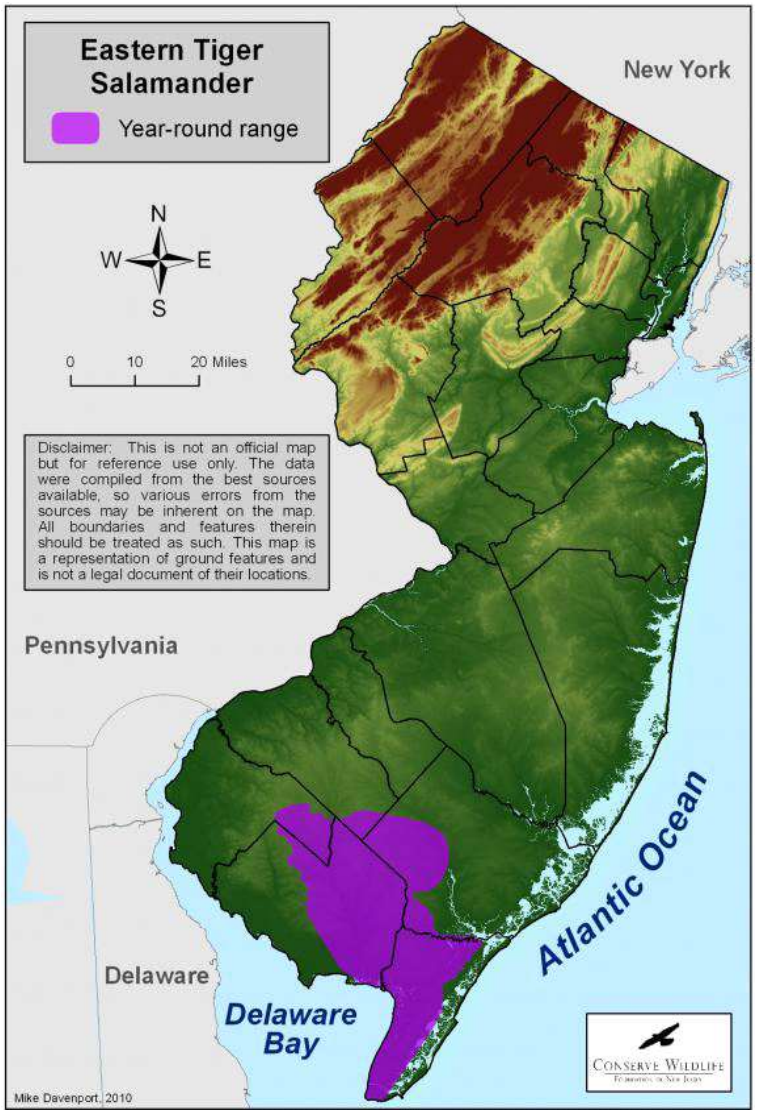
Abundance: Rare

Trend: Stable

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Forest	X
Wetlands	X



Eastern Tiger Salamander is continued on next page.

Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
	x	x		x	

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
DiLeo, K. 2016. Species Status Review of Amphibian and Reptiles, Results Report for the NJ Endangered and Nongame Species Advisory Committee. New Jersey Dept. of Environmental Protection, Division of Fish and Wildlife. Trenton, N.J.	☑	☑	☐
U.S. Fish and Wildlife Service. 2014. Strategic Plan. New York and Long Island Field Offices. Cortland, N.Y. Available from https://www.fws.gov/northeast/nyfo/Full%20report%202014%20Web.pdf	☐	☐	☑
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☐	☐

Longtail Salamander

Eurycea longicauda longicauda

Although typically yellow, the ground color of the Longtail Salamander can range from yellowish orange to yellowish brown, with occasional reddish individuals. There are black spots on the back and sides. The underside is whitish to pale yellow. A key identifying feature is the row of irregular vertical black bars on the sides of the long, slender, keeled tail. The tail is disproportionately long, almost two-thirds of the animal's total length. Habitat loss has led to a range contraction in the state. Stream and riparian alteration and filled in vernal pools limit the salamanders breeding success.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Reptiles & Amphibians

Taxa Sub Group: Amphibians

Species Group: Salamanders

Guild Group:

Conservation Target: Longtail Salamander

Conservation Status

State: T

S_Rank: S2

Federal:

G_Rank: G5T5

Population Status

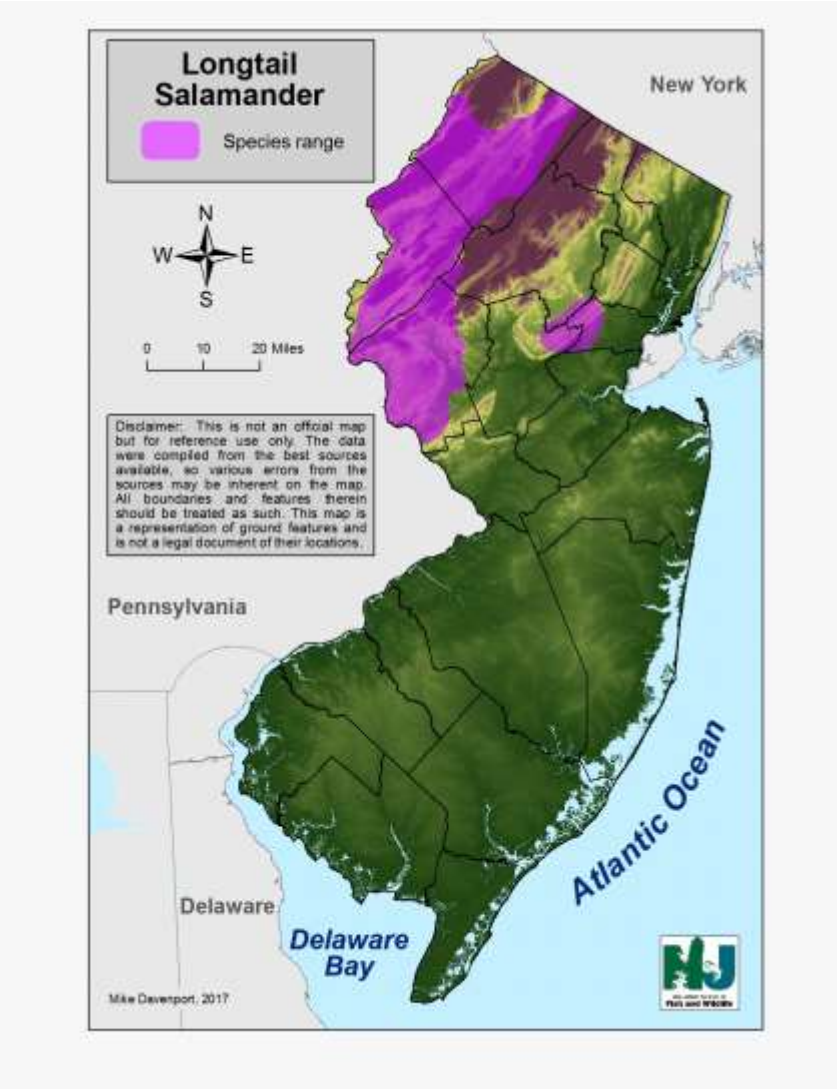
Abundance: Uncommon

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Coldwater Stream	X
Forest	X
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
			x		x

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☐	☐
Lannoo, M. 2005. Amphibian Declines: The Conservation Status of United States Species. Berkeley: University of California Press.	☐	☑	☐
Zarate, B. 2007. Long-tailed Salamanders. Report NJ T-1-4. New Jersey Dept. of Environmental Protection, Division of Fish and Wildlife, Endangered and Nongame Species Program. Trenton, N.J.	☑	☑	☐

New Jersey Chorus Frog

Pseudacris kalmi

The New Jersey Chorus Frog can be found in a variety of habitats throughout the state, including swamps, ditches, and vernal pools; however, it is not common in the core Pinelands. Ground color can be quite variable and ranges from gray to brown to olive, however it always has a light stripe along the upper lip and a dark stripe through the eye that runs down the flank to the groin. A dark triangle may be present between the eyes, and three dark stripes running down the back are usually present; the middle stripe commonly forms a "Y" towards the rear. The call is a repeated creaking that sounds like running a finger over the small teeth of a comb.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Reptiles & Amphibians

Taxa Sub Group: Amphibians

Species Group: Frogs and Toads

Guild Group: Vernal Pond & Pond Breeders

Conservation Target: Vernal Pond & Pond Breeders

Conservation Status

State: U

S_Rank: SU

Federal:

G_Rank: G4

Population Status

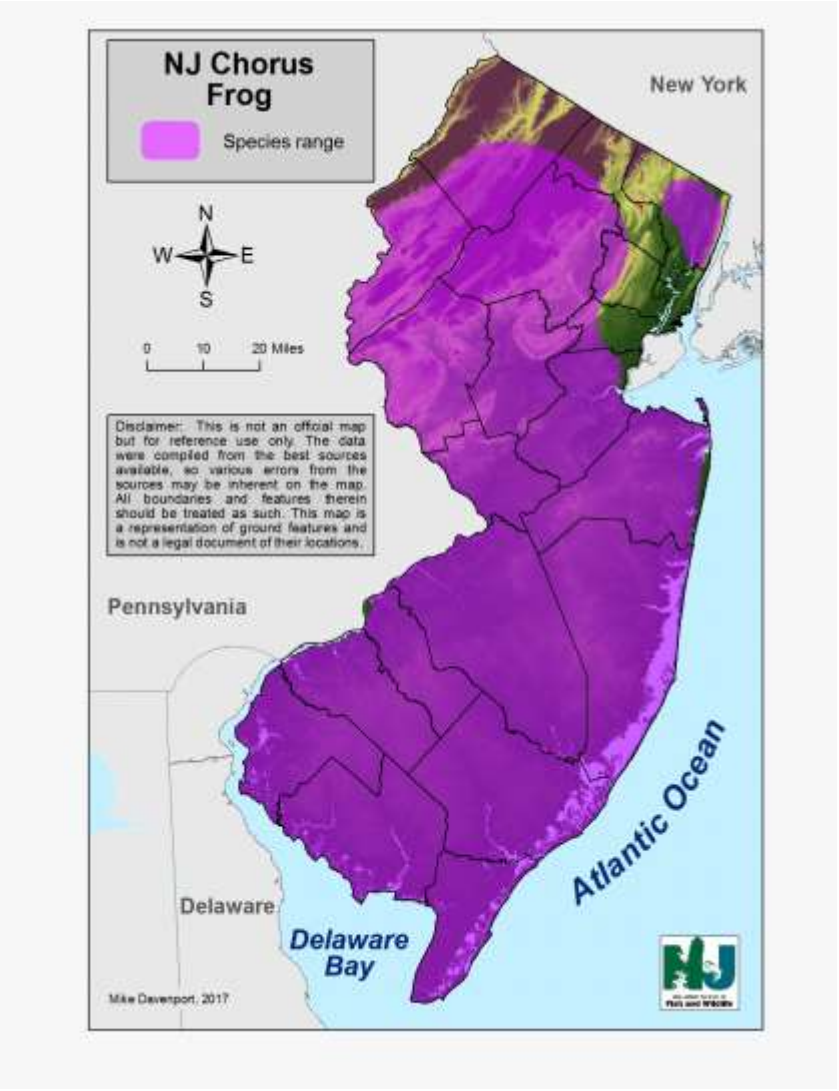
Abundance: Common

Trend: Unknown

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Forest	X
Shrub	X
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
	x	x	x	x	x

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Lannoo, M. 2005. Amphibian Declines: The Conservation Status of United States Species. Berkeley: University of California Press.	☑	☑	☐

Northern Black Racer

Coluber constrictor constrictor

The Northern Black Racer (Coluber constrictor constrictor) is a regionally imperiled species; NJ is one of this species' strongholds. This snake can be found throughout NJ in a variety of habitats ranging from dense to sparse hardwood, mixed and pine forests, rock outcrops in northern NJ, agricultural lands, old fields, and residential properties. This snake is primarily terrestrial, however they tend to climb trees and shrubs more frequently than some of the other terrestrial snakes in search of prey, escaping predators, and at times, sleeping. Their foods include insects, frogs, toads, small birds, and rodents, and racers have been known to eat newborns and hatchlings of other snakes; food selection may change with the snake's size/age.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Reptiles & Amphibians

Taxa Sub Group: Terrestrial Reptiles

Species Group: Snakes

Guild Group:

Conservation Target: Northern Black Racer

Conservation Status

State: U

S_Rank: SU

Federal:

G_Rank: G5T5

Population Status

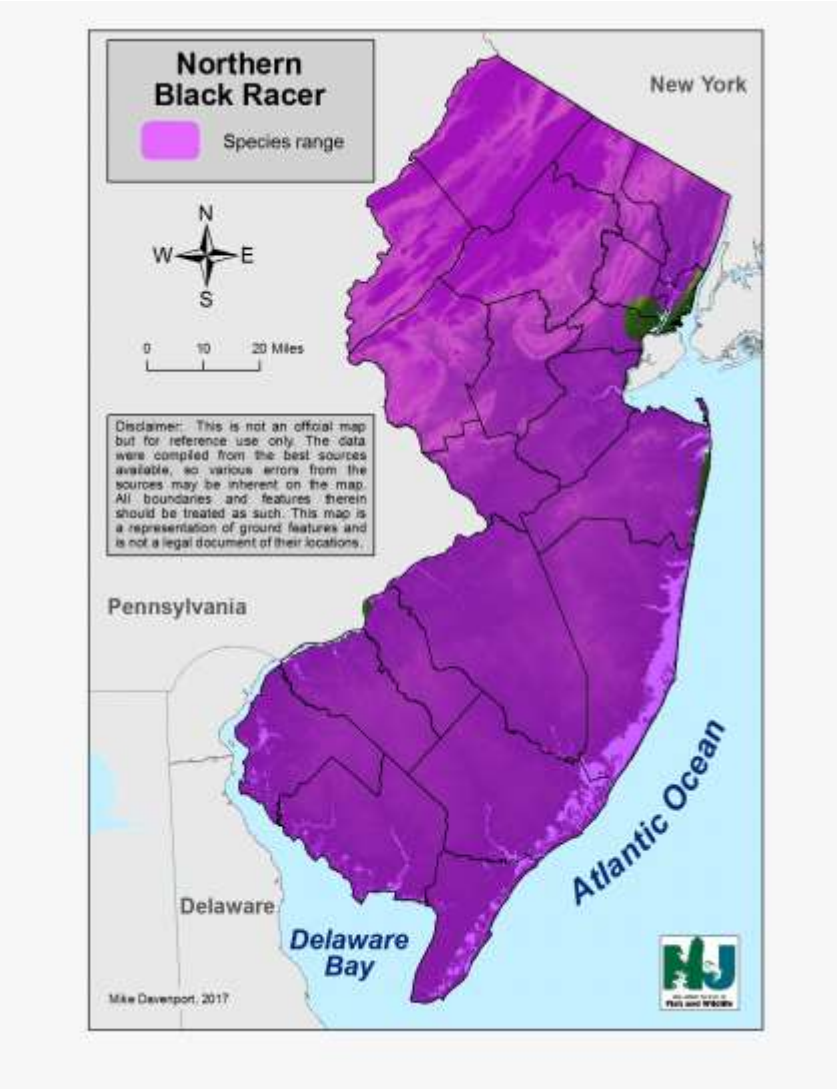
Abundance: Common

Trend: Stable

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Barren and Exposed Rock	X
Forest	X
Grassland	X
Shrub	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
	x	x	x	x	x

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
DiLeo, K. 2016. Species Status Review of Amphibian and Reptiles, Results Report for the NJ Endangered and Nongame Species Advisory Committee. New Jersey Dept. of Environmental Protection, Division of Fish and Wildlife. Trenton, N.J.	☑	☑	☐

Northern Diamondback Terrapin

Malaclemys terrapin terrapin

The Northern Diamondback Terrapin exclusively inhabits coastal salt marshes, estuaries, tidal creeks and ditches with brackish water, bordered by Spartina grass. The species has a very small home range, with some individuals occupying the same creek year after year. In NJ, terrapins can be found in all coastal counties from Delaware Bay, the Atlantic Coast, northward to the lower Hackensack River. Terrapin populations are threatened by coastal development, drowning in crab traps, road mortality, nest predation, illegal collection, and abandoned ghost traps. In addition, their high site fidelity and tendency to aggregate in hibernacula make them especially vulnerable to overharvesting.

SWAP Classification

Broad Group: Estuarine Wildlife

Taxon: Reptiles & Amphibians

Taxa Sub Group:

Species Group: Turtles

Guild Group:

Conservation Target: Northern Diamondback Terrapin

Conservation Status

State:

S_Rank: S3

Federal:

G_Rank: G4T4Q

Population Status

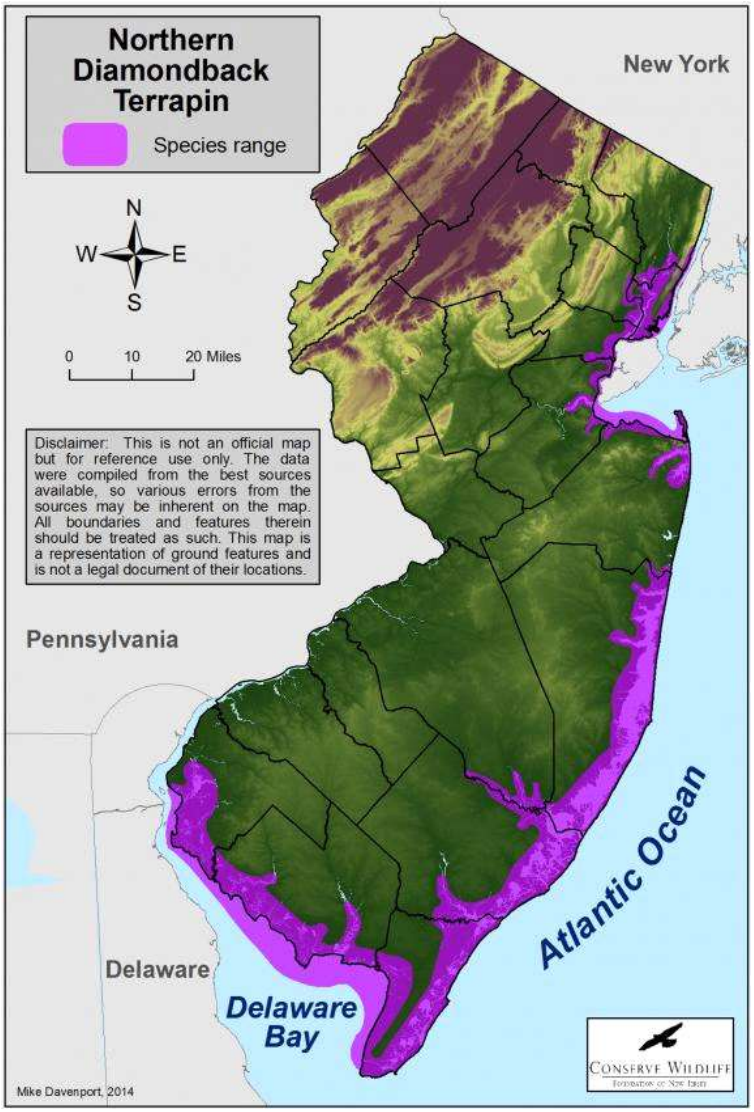
Abundance: Common

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Beach and Dune	X
Marine Nearshore Zone	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
x	x	x	x	x	

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Wnek J. 2014. Assessment of diamondback terrapin populations at North Sedge Island and along southern Island Beach State Park, New Jersey. A brief summary of diamondback terrapin research conducted at North Sedge Island and Island Beach State Park, New Jersey from 2002 – 2013.	☑	☑	☐
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☑	☐
Egger, S. 2013. The Northern Diamondback Terrapin (Malaclemys terrapin terrapin) in the Northeastern United States: A Regional Strategy. Prepared by the Conserve Wildlife Foundation of NJ for the NE Association of Fish and Wildlife Agencies. RCN Grants Program. Available from http://rcngrants.org/sites/default/files/final_reports/RCN%20NE%20TERRAPIN%20CONSERVATION%20STRATEGY%20April_2016converted.pdf	☐	☐	☑

Northern Pine Snake

Pituophis melanoleucus melanoleucus

The Northern Pine Snake (Pituophis melanoleucus melanoleucus) is a State Threatened species with most of NJ's remaining population limited to the Pinelands National Reserve within the physiographic province, the Pinelands Region, and suitable fringe habitats. It is a mostly semi-fossorial species with rather narrow habitat requirements. This snake inhabits pine and pine-oak forests, and well-drained sandy and/or sparsely vegetated open areas. It has the ability to burrow in loose, sandy soils; an essential need for nest and hibernacula excavation, as well as pursuing rodent prey. This snake shows a strong fidelity to both winter hibernacula and nesting areas, with both often being used repeatedly by the same snake(s). Their foods include rodents and other small mammals, birds and their eggs, but smaller/younger snakes may rely on rodents, lizards and insects.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Reptiles & Amphibians

Taxa Sub Group: Terrestrial Reptiles

Species Group: Snakes

Guild Group: Pine Barrens Snakes

Conservation Target: Pine Barrens Snakes

Conservation Status

State: T

S_Rank: S2

Federal:

G_Rank: G4T4

Population Status

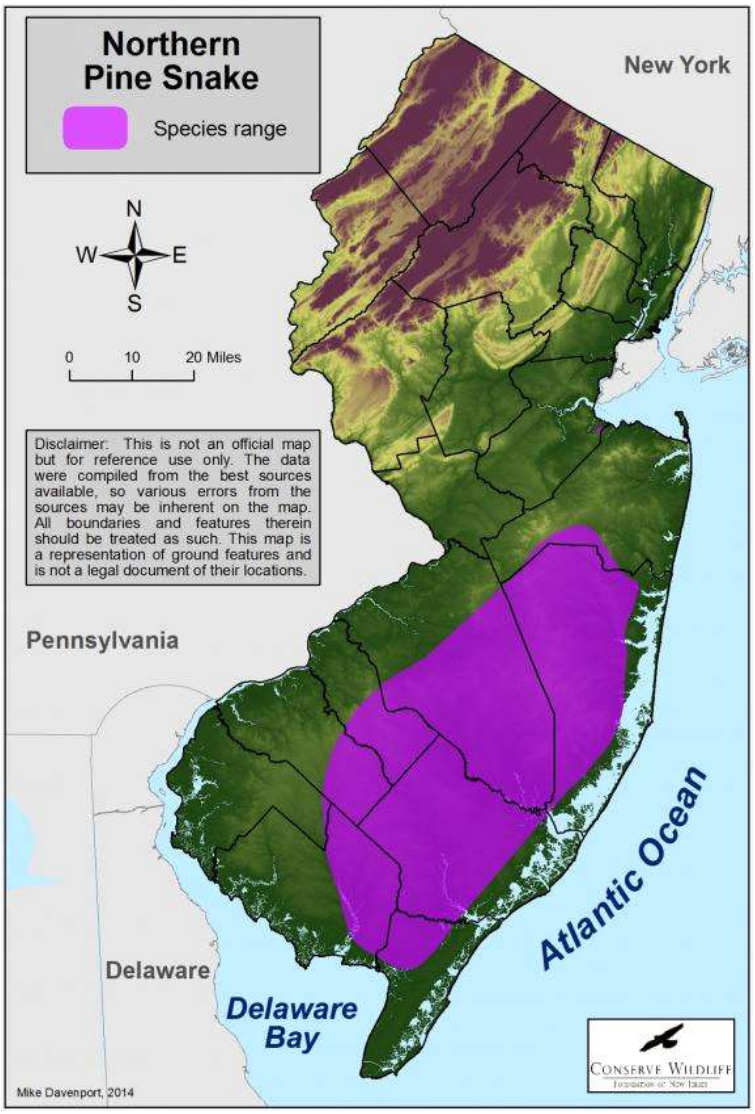
Abundance: Uncommon

Trend: Unknown

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Forest	X
Shrub	X
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
	x	x		x	

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☑	☐
DiLeo, K. 2016. Species Status Review of Amphibian and Reptiles, Results Report for the NJ Endangered and Nongame Species Advisory Committee. New Jersey Dept. of Environmental Protection, Division of Fish and Wildlife. Trenton, N.J.	☑	☐	☐

Northern Red Salamander

Pseudotriton ruber ruber

The Northern Red Salamander is red to reddish orange and has numerous irregular black spots and a yellow iris. The underside is marked with black or brown spots; some younger individuals may have unmarked bellies. Older adults are usually less brilliant and more of an orangish or purplish brown color. Spots tend to run together on older individuals. This salamander appears well dispersed through the suitable habitats in the state, such as headwater streams, springs, seeps, and other groundwater fed features. The loss or alteration of these habitats will impact local populations negatively.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Reptiles & Amphibians

Taxa Sub Group: Amphibians

Species Group: Salamanders

Guild Group:

Conservation Target: Northern Red Salamander

Conservation Status

State: S

S_Rank: S4

Federal:

G_Rank: G5T5

Population Status

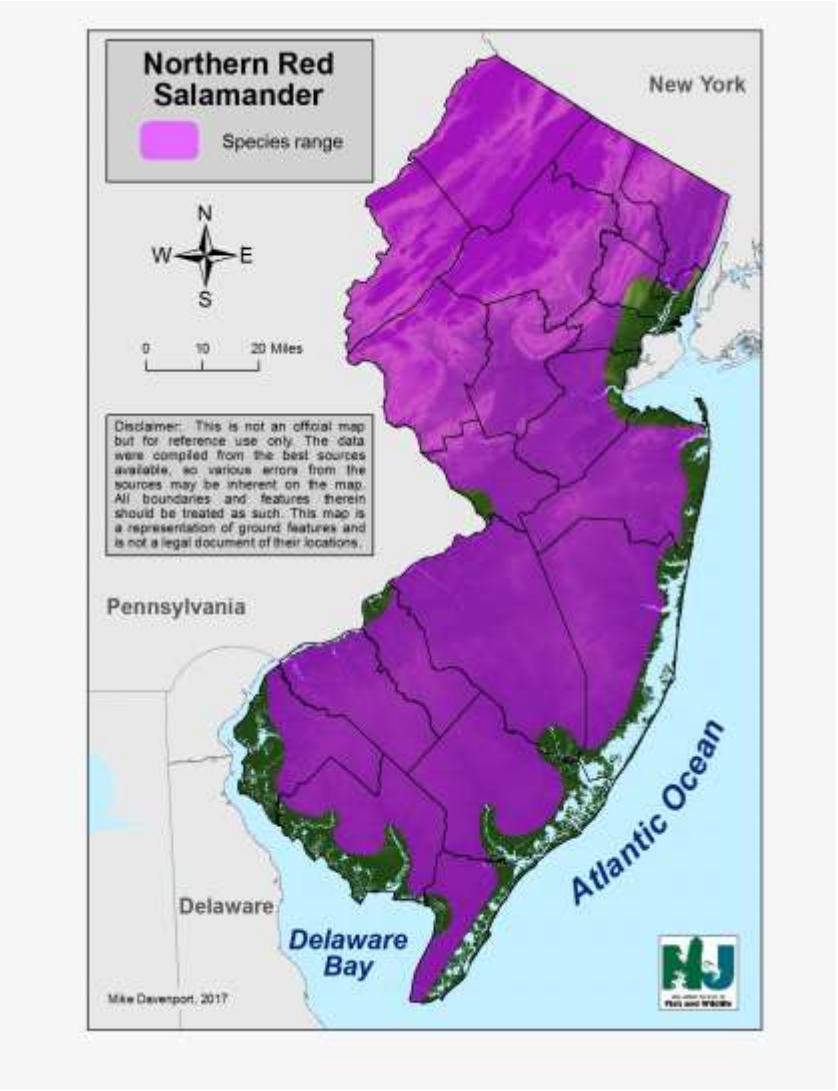
Abundance: Common

Trend: Stable

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Forest	X
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
			x	x	x

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Lannoo, M. 2005. Amphibian Declines: The Conservation Status of United States Species. Berkeley: University of California Press.	☑	☑	☐
IUCN SSC Amphibian Specialist Group. 2014. Pseudotriton ruber. The IUCN Red List of Threatened Species 2014: e.T59404A56253351. Available from http://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T59404A56253351.en. (accessed January 2016).	☑	☑	☐

Northern Scarlet Snake

Cemophora coccinea copei

The Northern Scarlet Snake (Cemophora coccinea copei) is a regionally imperiled species considered uncommon in NJ. It is limited in NJ to the physiographic province, the Outer Coastal Plain. It is a mostly semi-fossorial species inhabiting hardwood, mixed and pine forests, as well as adjacent well-drained sandy, loamy and/or sparsely vegetated open areas. It may also be found in or near damp woodlands. This species seems to prefer being under shelter such as logs, boards, or debris, and will lay its eggs underground or under moist humus. They feed primarily on the eggs of other reptiles.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Reptiles & Amphibians

Taxa Sub Group: Terrestrial Reptiles

Species Group: Snakes

Guild Group: Pine Barrens Snakes

Conservation Target: Pine Barrens Snakes

Conservation Status

State: U

S_Rank: SU

Federal:

G_Rank: G5T5

Population Status

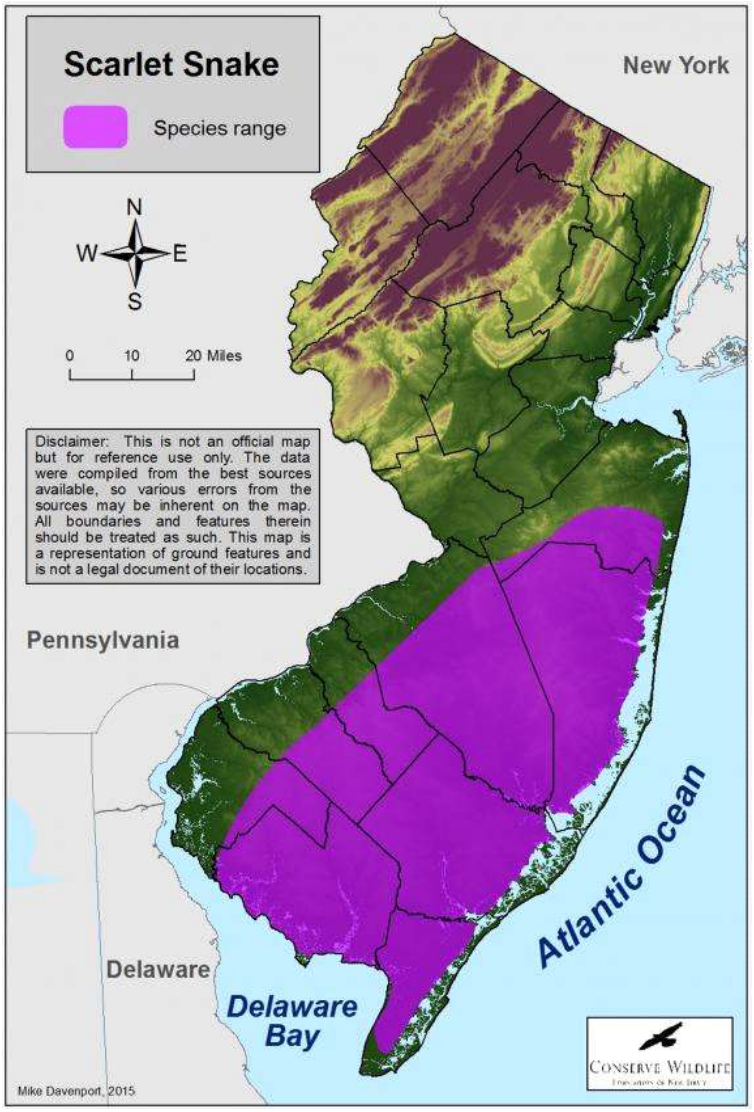
Abundance: Rare

Trend: Unknown

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Forest	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
	x	x		x	

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☐	☑	☐
DiLeo, K. 2016. Species Status Review of Amphibian and Reptiles, Results Report for the NJ Endangered and Nongame Species Advisory Committee. New Jersey Dept. of Environmental Protection, Division of Fish and Wildlife. Trenton, N.J.	☑	☐	☐

Pine Barrens Treefrog

Hyla andersonii

The Pine Barrens Treefrog is easily identified by the lavender stripes bordered by white that run through the eye and along the side of the body and are set on a bright green ground color. There is considerable orange concealed on the inner surface of the thigh. The call is a distinctive, repetitive, nasal "quonk-quonk." This species is primarily restricted to the brown, acidic waters of the the Pine Barrens. While it prefers ponds and vernal pools, it can be found calling from burrow pits, temporary streams, and the edges of permanent impoundments.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Reptiles & Amphibians

Taxa Sub Group: Amphibians

Species Group: Frogs and Toads

Guild Group: Vernal Pond & Pond Breeders

Conservation Target: Vernal Pond & Pond Breeders

Conservation Status

State: T

S_Rank: S2

Federal:

G_Rank: G4

Population Status

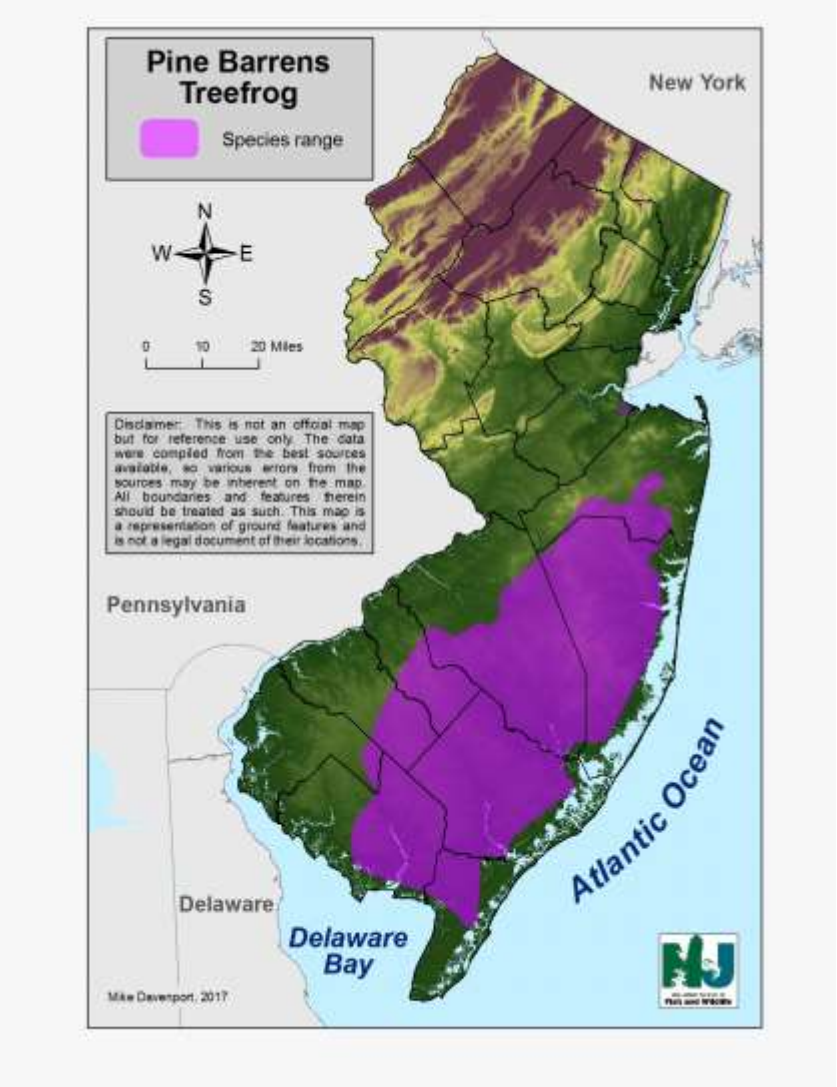
Abundance: Rare

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Forest	X
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
	x	x		x	

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Zampella, R.A. and J.F. Bunnell. 2000. The distribution of anurans in two river systems of a Coastal Plain watershed. Journal of Herpetology 34(2):210–221.	☐	☑	☐
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☑	☐
Florida Fish and Wildlife Conservation Commission. 2013. A species action plan for the Pine Barrens treefrog. Tallahassee, Florida.	☐	☐	☑
Lannoo, M. 2005. Amphibian Declines: The Conservation Status of United States Species. Berkeley: University of California Press.	☑	☑	☐

Timber Rattlesnake

Crotalus horridus

The Timber Rattlesnake (Crotalus horridus) is a State Endangered and regionally imperiled species. It is a forest-dwelling species in NJ's northern mountains and Pinelands Region. The northern populations rely heavily on geomorphic features (e.g., talus, rock outcrops and fissures) for winter hibernation, gestation, and birthing; sites that are often considered ancestral sites due to their repeated use by individuals and generations. The Pinelands population hibernates along the edges of wetlands and stream embankments. Individuals within the Pinelands may shift their hibernacula slightly during their lives, but typically remain within the same localized area and aquatic system. Pinelands' gravid females gestate and birth in a variety of places ranging from natural debris (e.g., fallen trees, rotting tree stumps) to old railroad ties, and garbage (e.g., car hoods, refrigerator doors) and will reuse areas whenever possible. The rattlesnakes' life history strategy (i.e., late reproductive maturity, low fecundity, long intervals between breeding) predisposes them to population declines. Their primary food source is rodents, although larger adults can eat ground-foraging birds and small rabbits.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Reptiles & Amphibians

Taxa Sub Group: Terrestrial Reptiles

Species Group: Snakes

Guild Group:

Conservation Target: Timber Rattlesnake

Conservation Status

State: E

S_Rank: S1

Federal:

G_Rank: G4T4

Population Status

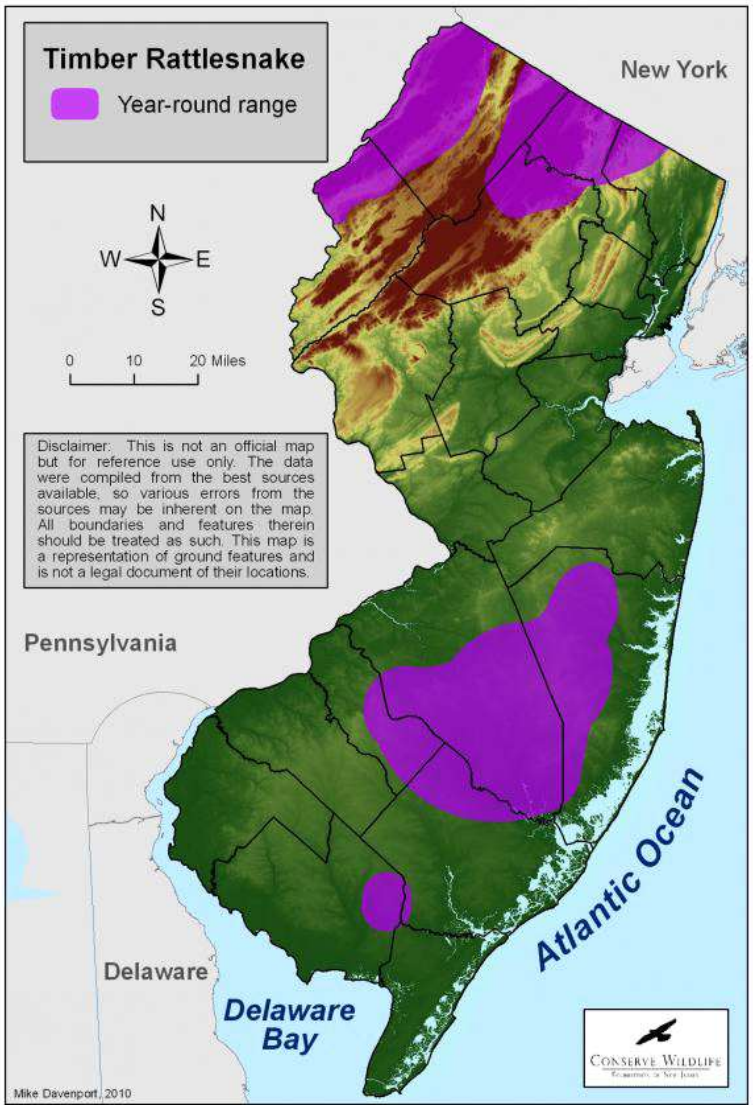
Abundance: Rare

Trend: Unknown

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Barren and Exposed Rock	X
Forest	X
Shrub	X
Warmwater Stream	X
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
				x	x

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☐	☑	☐
Vermont Fish and Wildlife Department. 2015. Vermont Timber Rattlesnake Recovery Plan. Montpelier, VT. Available from http://www.vtfishandwildlife.com/common/pages/DisplayFile.aspx?itemId=503500	☐	☐	☑
DiLeo, K. 2016. Species Status Review of Amphibian and Reptiles, Results Report for the NJ Endangered and Nongame Species Advisory Committee. New Jersey Dept. of Environmental Protection, Division of Fish and Wildlife. Trenton, N.J.	☑	☐	☐
Pennsylvania Fish and Boat Commission. 2011. Species Action Plan: Timber Rattlesnake (Crotalus horridus). Harrisburg, PA. Available from http://www.fishandboat.com/Resource/Documents/species-plan-timber-rattlesnake.pdf	☐	☐	☑

Wood Turtle

Glyptemys insculpta

The Wood Turtle is a medium-sized freshwater turtle found in the central and northern parts of the state. The species prefers residing in and near stream and riparian habitats, but is also known to disperse well into the surrounding uplands. The shell is a light to dark brown, with a central keel, and often sunburst patterning. An orange to red coloration shows on the neck and limbs. Upland habitat loss, natural succession of nesting areas, stream alterations, and vehicle-caused road mortality have all contributed to the decline of health New Jersey populations. The Wood Turtle is also collected illegally from the wild.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Reptiles & Amphibians

Taxa Sub Group: Terrestrial Reptiles

Species Group: Turtles

Guild Group:

Conservation Target: Wood Turtle

Conservation Status

State: T

S_Rank: S2

Federal:

G_Rank: G4

Population Status

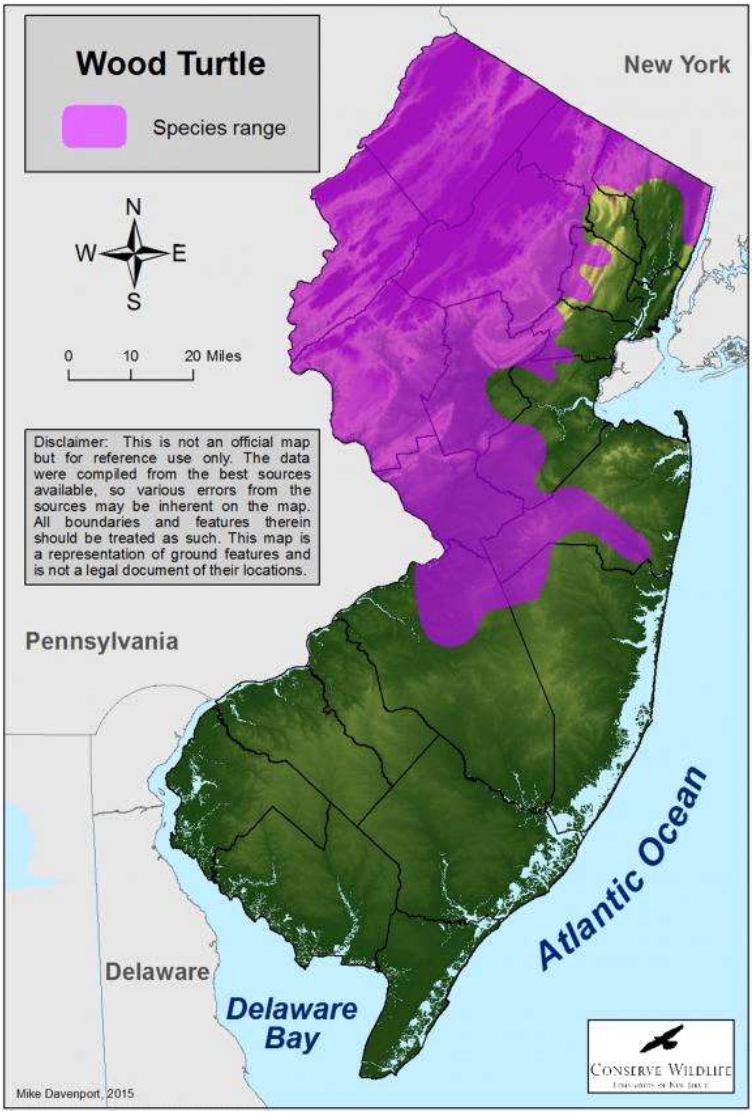
Abundance: Uncommon

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Forest	X
Grassland	X
Shrub	X
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
			x		x

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Jones, M., and L. Willey. 2015. Status and Conservation of the Wood Turtle in the Northeastern United States. 271 pp. Available from http://rcngrants.org/sites/default/files/datasets/RCN2011-02v2.pdf (accessed January 2016).	☑	☑	☑
Harding J., and T. Bloomer. 1979. The Wood turtle, Clemmys insculpta . . . A natural history. Bulletin of the New York Herpetological Society 15: 9-26.	☐	☑	☐
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☐	☐

Fish

Alewife

Alosa pseudoharengus

A schooling, andromous bony fish native to the east coast of North America. Characterized by a silver body, generally deeper than Blueback, with a blue dorsum and dark spot near the opercle. Primarily planktivorous as juveniles, but feeds on small fish at larger sizes. Freshwater spawners known to return to their natal streams during migrations.

SWAP Classification

Broad Group: Estuarine Wildlife

Taxon: Fish

Taxa Sub Group: Marine Fish

Species Group:

Guild Group: Anadromous & Semi-anadromous Fish

Conservation Target: Anadromous & Semi-anadromous Fish

Conservation Status

State:

S_Rank: SU

Federal:

G_Rank: G5

Population Status

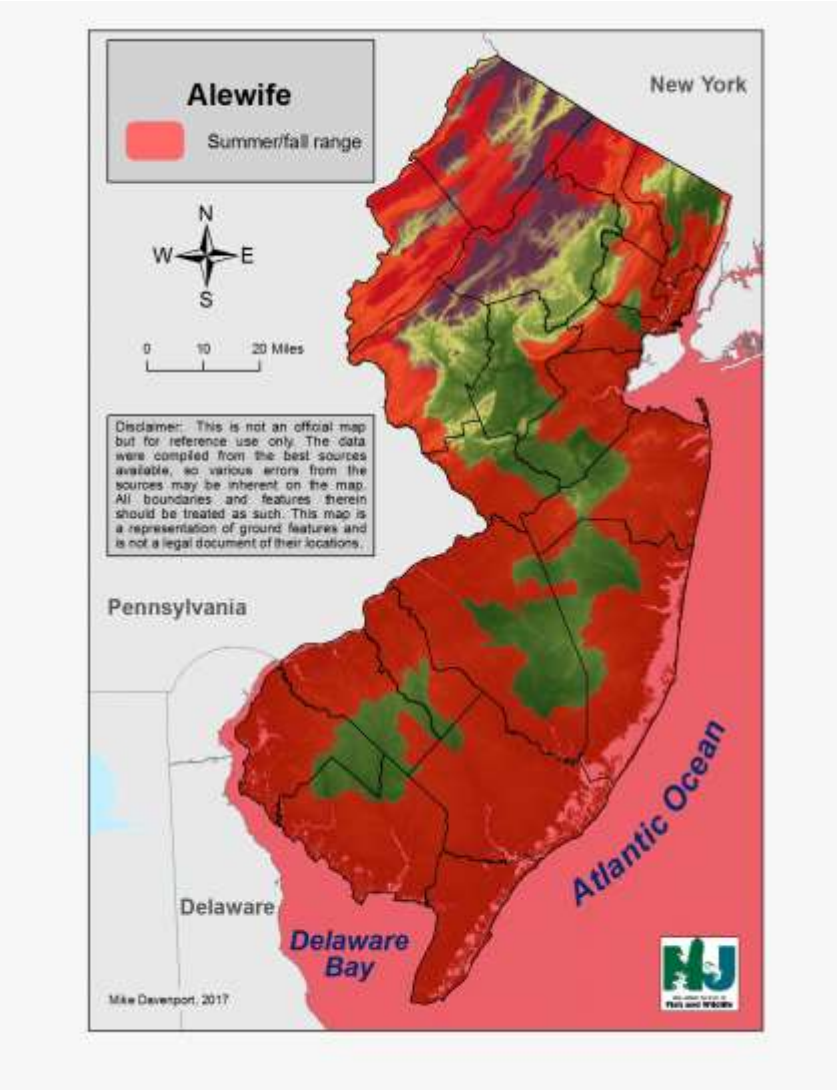
Abundance: Common

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Marine Nearshore Zone	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
x	x	x	x		

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Atlantic States Marine Fisheries Commission. 2010. Amendment 3 to the Interstate Fishery Management Plan for Shad and River Herring. ASMFC, Arlington, VA. Available from: http://www.asmfc.org/uploads/file/Amendment3_FINALshad.pdf (accessed February 2016).	☐	☐	☑
National Marine Fisheries Service. 2009. River Herring. NOAA Office of Protected Resources, Silver Spring, MD. Available from http://www.fisheries.noaa.gov/pr/pdfs/species/riverherring_detailed.pdf (accessed February 2016).	☑	☑	☐

Atlantic Sturgeon

Acipenser oxyrinchus

A primitive anadromous bony fish native to the east coast of North America. Characterized by a gray, round, elongate body covered in rows of bony scutes and having mandibular barbels. A bottom-feeder inhabiting the riverine, marine, and intermediate habitats. Generally larger than Shortnose Sturgeon, shorter-lived, and possess a differently structured snout. Once valued for caviar, now a member of the Federal Endangered species list.

SWAP Classification

Broad Group: Estuarine Wildlife

Taxon: Fish

Taxa Sub Group: Marine Fish

Species Group:

Guild Group: Anadromous & Semi-anadromous Fish

Conservation Target: Anadromous & Semi-anadromous Fish

Conservation Status

State: E

S_Rank: S1

Federal:

G_Rank: G3

Population Status

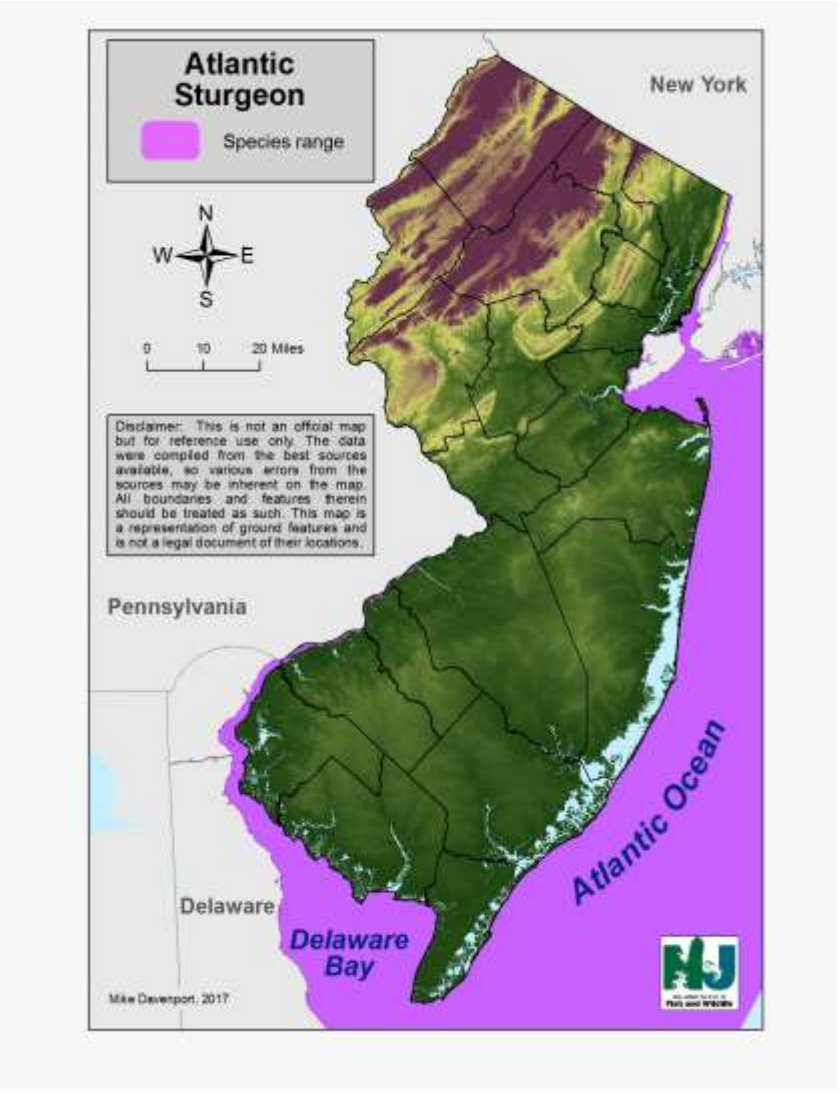
Abundance: Uncommon

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Marine Nearshore Zone	X
Marine Offshore Zone	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
x	x	x	x		

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
U.S. Fish and Wildlife Service. 2012. Federal endangered species listed 2012. Available from http://www.nmfs.noaa.gov/pr/species/esa/listed.htm (accessed January 2016).	☐	☐	☑
National Marine Fisheries Service. 2015. Atlantic Sturgeon. NOAA Office of Protected Resources, Silver Spring, MD. Available from http://www.fisheries.noaa.gov/pr/species/fish/atlantic-sturgeon.html (accessed February 2016).	☑	☑	☐
Risenhoover AD. 2012. Endangered and Threatened Wildlife and Plants; Threatened and Endangered Status for Distinct Population Segments of Atlantic Sturgeon in the Northeast Region. Federal Register 77(Issue 24):5880-5912.	☐	☐	☑

Banded Sunfish

Enneacanthus obesus

The Banded Sunfish closely resembles the more widely distributed Bluespotted Sunfish, with an olive-colored base with bluish-gold colored spots, but has 5 to 8 vertical bars. This species rarely reaches 4 inches in length. Found along the Atlantic Coast from Florida to Maine, its New Jersey distribution is primarily limited to the Pinelands. It is more common than the other native sunfish in the Pinelands, found in nearly 70% of surveys conducted within the Pinelands since 2000. The Banded Sunfish inhabits heavily vegetated ponds and sluggish sand or mud bottomed pools. Threats to Banded Sunfish include land-use changes that impact water quality resulting in increased pH and nutrient load, loss of native aquatic vegetation, and competition and predation exhorted by non-native fishes. Similar to other native fishes in the Pinelands, the naturally acidic water serves to protect the acid-tolerant native species against the establishment of non-native fishes.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Fish

Taxa Sub Group: Freshwater Fish

Species Group:

Guild Group: Pinelands Freshwater Fish

Conservation Target: Pinelands Freshwater Fish

Conservation Status

State:

S_Rank: S4

Federal:

G_Rank: G5

Population Status

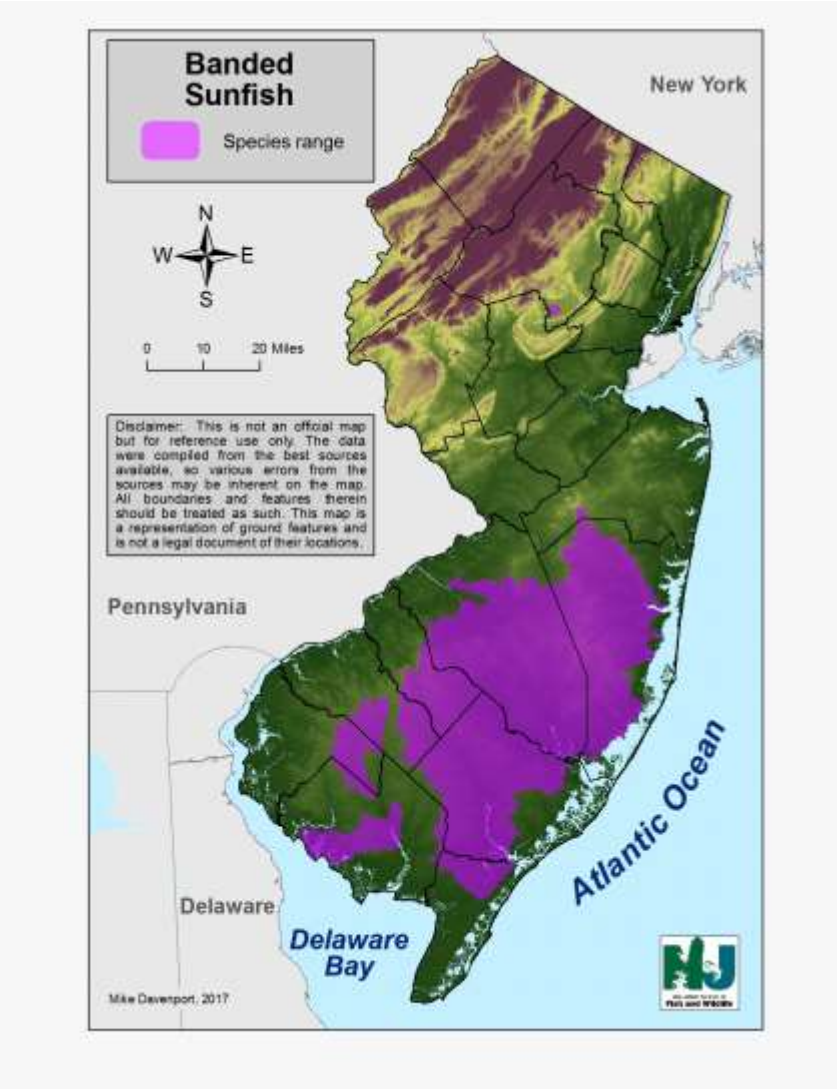
Abundance: Uncommon

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Coldwater Stream	X
Warmwater Stream	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
		X	x	X	

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Arndt, R.J. 2004. Annotated Checklist and Distribution of New Jersey Freshwater Fishes, With Comments on Abundance. The Bulletin: New Jersey Academy of Science: 49(1):1-34.	☑	☐	☐
Bowers-Altman, J. 2016. Species Status Review of Freshwater Fishes (Draft). New Jersey Dept. of Environmental Protection, Division of Fish and Wildlife, Endangered and Nongame Species Program. Trenton, N.J.	☑	☑	☐
New Jersey Division of Fish and WIldlife FishTrack Database. 2015. Trenton, N.J.	☑	☑	☐

Blackbanded Sunfish

Enneacanthus chaetodon

One of the most attractive freshwater fish in New Jersey, the Blackbanded Sunfish has a shimmering silver body with six distinct black vertical bars, red-bordered pelvic fins, and measures up to 3 ¼ inches. The American Fisheries Society recognizes it as a vulnerable species, with drastic declines reported along the Atlantic Coast from Florida to New Jersey, where it is listed as Endangered in three states. Its current stronghold is the Pinelands, where the naturally acidic water hinders the ability of non-native fishes such as Largemouth Bass, Bluegill, and Crappie to establish significant populations, due to their reduced ability to spawn in waters with a pH of less than 5. The Blackbanded Sunfish prefers forested ponds that are heavily vegetated with native species such as Bladderworts. Within their preferred habitats they can be locally common. Threats to Blackbanded Sunfish include land-use changes that impact water quality resulting in increased pH and nutrient load, loss of native aquatic vegetation, and competition and predation exhorted by non-native fishes.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Fish

Taxa Sub Group: Freshwater Fish

Species Group:

Guild Group: Pinelands Freshwater Fish

Conservation Target: Pinelands Freshwater Fish

Conservation Status

State:

S_Rank: S4

Federal:

G_Rank: G4

Population Status

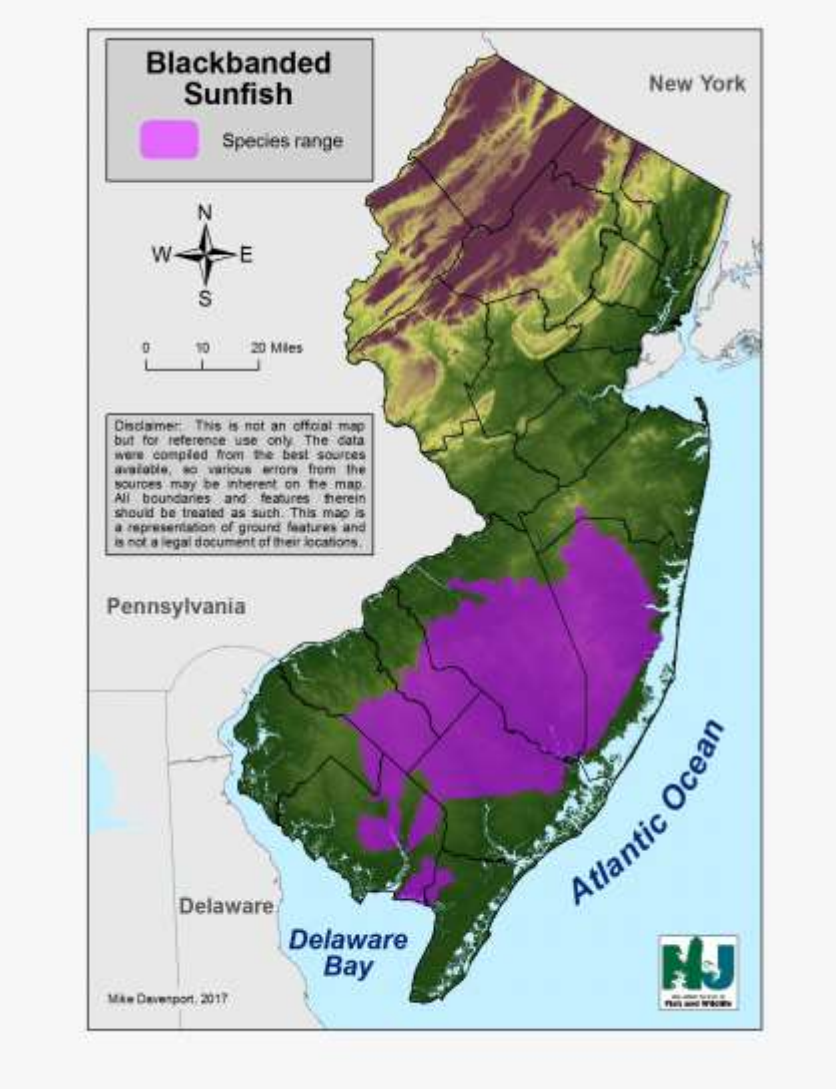
Abundance: Uncommon

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Warmwater Stream	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
		X		X	

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Jelks, H.L. et al. 2008. Conservation Status of Imperiled North American Freshwater and Diadromous Fishes. Fisheries 33(8):372-407.	☐	☑	☐
Arndt, R.J. 2004. Annotated Checklist and Distribution of New Jersey Freshwater Fishes, With Comments on Abundance. The Bulletin: New Jersey Academy of Science: 49(1):1-34.	☑	☐	☐
Bowers-Altman, J. 2016. Species Status Review of Freshwater Fishes (Draft). New Jersey Dept. of Environmental Protection, Division of Fish and Wildlife, Endangered and Nongame Species Program. Trenton, N.J.	☑	☑	☐
New Jersey Division of Fish and WIldlife FishTrack Database. 2015. Trenton, N.J.	☑	☑	☐

Blueback Herring

Alosa aestivalis

A schooling, andromous bony fish native to the east coast of North America. Characterized by a silver body, more compressed than an Alewife, with a blue dorsum and dark-colored peritoneum. Primarily planktivorous as juveniles, but feeds on small fish at larger sizes. Freshwater spawners known to return to their natal streams during migrations.

SWAP Classification

Broad Group: Estuarine Wildlife

Taxon: Fish

Taxa Sub Group: Marine Fish

Species Group:

Guild Group: Anadromous & Semi-anadromous Fish

Conservation Target: Anadromous & Semi-anadromous Fish

Conservation Status

State:

S_Rank: S5

Federal:

G_Rank: G5

Population Status

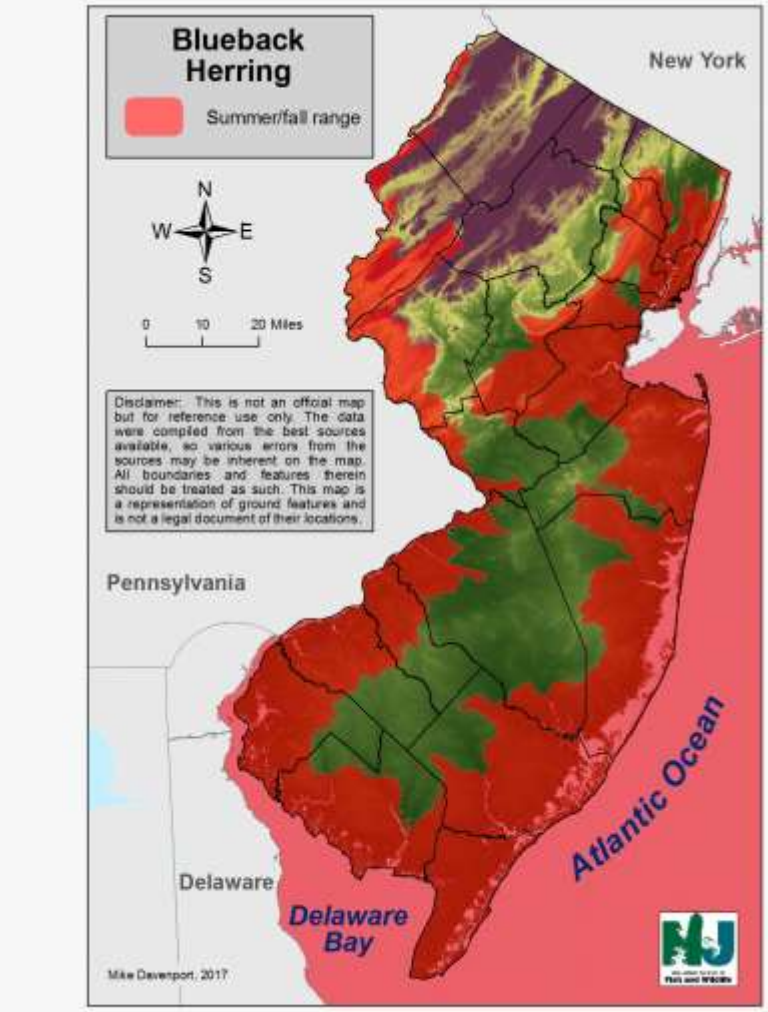
Abundance: Common

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Marine Nearshore Zone	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
x	x	x	x		

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Atlantic States Marine Fisheries Commission. 2010. Amendment 3 to the Interstate Fishery Management Plan for Shad and River Herring. ASMFC, Arlington, VA. Available from: http://www.asmfc.org/uploads/file/Amendment3_FINALshad.pdf (accessed February 2016).	☐	☐	☑
National Marine Fisheries Service. 2009. River Herring. NOAA Office of Protected Resources, Silver Spring, MD. Available from http://www.fisheries.noaa.gov/pr/pdfs/species/riverherring_detailed.pdf (accessed February 2016).	☑	☑	☐

Bridle Shiner

Notropis bifrenatus

The Bridle Shiner is a slender 2-inch minnow with a dark lateral band extending from snout to base of tail, straw-colored above and white below, closely resembling the Ironcolor Shiner. This species has declined throughout its range from North Carolina to Maine where it was once considered abundant and has significantly declined in New Jersey since the 1950's. Only found in a few scattered locations in the northern portion of New Jersey, of which their concentration resides in the Millstone watershed. This fish prefers vegetated ponds, sluggish streams, and medium-sized rivers. This very short-lived minnow is threatened by habitat alteration such as vegetation removal, turbidity, changes in water level/flow, and predation from non-native fish species.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Fish

Taxa Sub Group: Freshwater Fish

Species Group:

Guild Group: Vulnerable Minnows

Conservation Target: Vulnerable Minnows

Conservation Status

State:

S_Rank: S4

Federal:

G_Rank: G3

Population Status

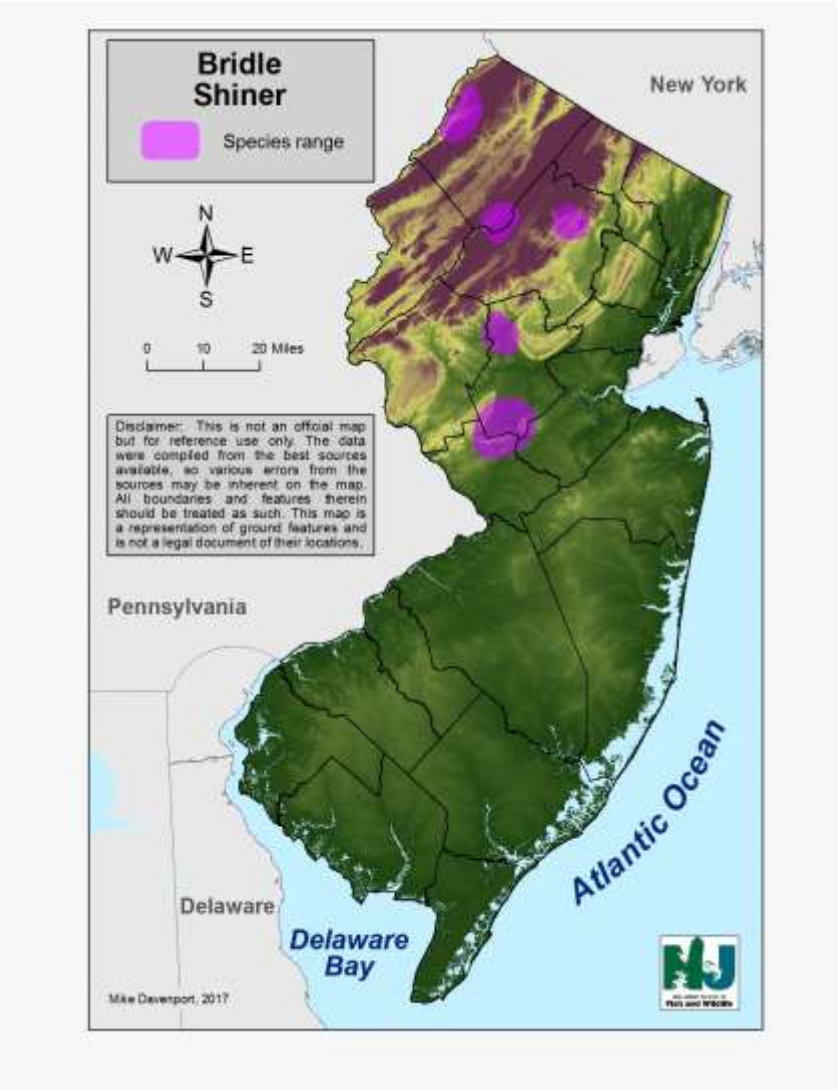
Abundance: Extremely Rare

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Coldwater Stream	X
Warmwater Stream	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont	InnerCoastal Plains	Pinelands	Skylands
				X		X

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Arndt, R.J. 2004. Annotated Checklist and Distribution of New Jersey Freshwater Fishes, With Comments on Abundance. The Bulletin: New Jersey Academy of Science: 49(1):1-34.	☑	☐	☐
New Jersey Division of Fish and WIldlife FishTrack Database. 2015. Trenton, N.J.	☑	☑	☐
Bowers-Altman, J. 2016. Species Status Review of Freshwater Fishes (Draft). New Jersey Dept. of Environmental Protection, Division of Fish and Wildlife, Endangered and Nongame Species Program. Trenton, N.J.	☑	☑	☐
Jelks, H.L. et al. 2008. Conservation Status of Imperiled North American Freshwater and Diadromous Fishes. Fisheries 33(8):372-407.	☐	☑	☐

Brook Trout

Salvelinus fontinalis

Brook Trout, the only salmonid fish species native to New Jersey, is highly valued for its beauty, sport fish qualities, and as an indicator of good water quality and a healthy ecosystem. To survive and reproduce it requires clean, cold water (<21°C) year-round, and a rocky, silt-free substrate. This habitat is primarily found in small headwater streams scattered throughout the Appalachian foothills and mountains within the two northern physiographic provinces (Ridge and Valley, and Highlands). Today, Brook Trout survive in less than half their original range in our state. Habitat degradation and fragmentation caused by urbanization, road and dam construction, and also the stockings of non-native trout species have contributed to this decline. The effects of climate change and the potential threat of air temperature increases may further reduce the current range of this coldwater fish species.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Fish

Taxa Sub Group: Freshwater Fish

Species Group:

Guild Group: Coldwater Stream Fish

Conservation Target: Brook Trout

Conservation Status

State:

S_Rank: S3

Federal:

G_Rank: G5

Population Status

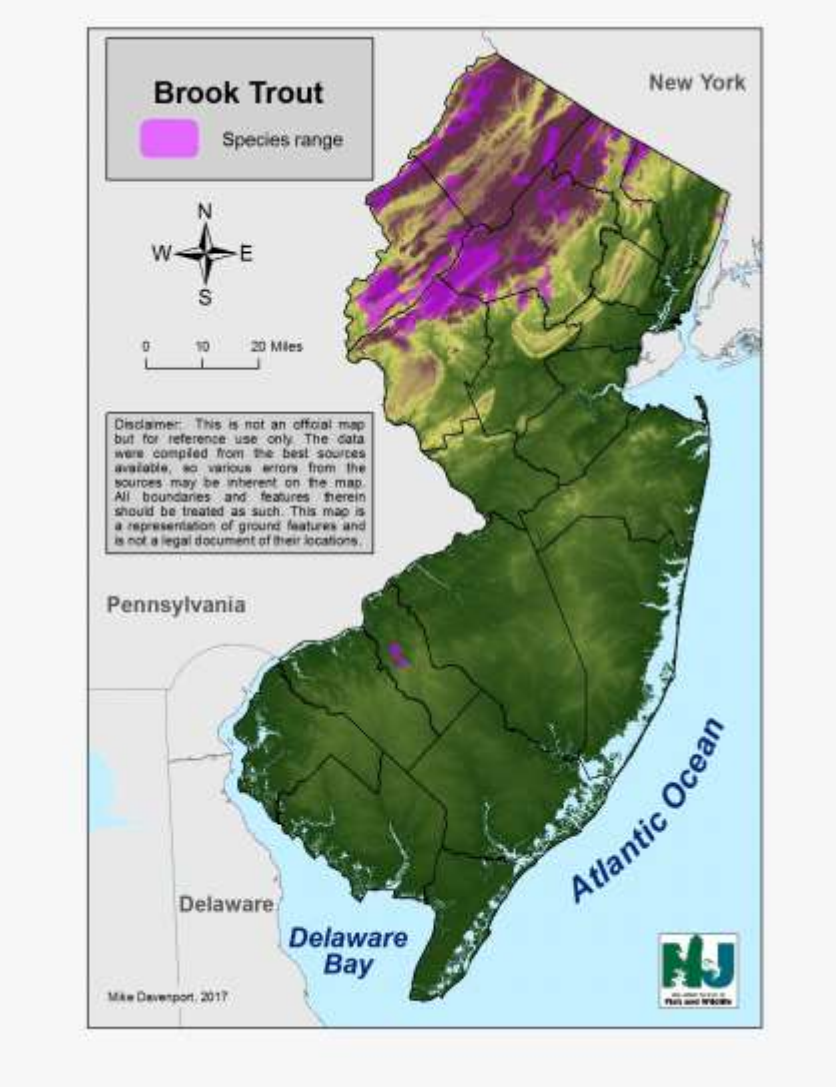
Abundance: Uncommon

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Coldwater Stream	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
			x		x

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Arndt, R.J. 2004. Annotated Checklist and Distribution of New Jersey Freshwater Fishes, With Comments on Abundance. The Bulletin: New Jersey Academy of Science: 49(1):1-34.	☑	☐	☐
Eastern Brook Trout Joint Venture (EBTJV). 2006. Eastern Brook Trout: Status and Threats. Available from www.easternbrooktrout.org (accessed January 2016).	☐	☑	☐
New Jersey Division of Fish and WIldlife FishTrack Database. 2015. Trenton, N.J.	☑	☑	☐
Hamilton, P.L., and L.M. Barno. 2005. New Jersey's coldwater fisheries management plan. New Jersey Dept. of Environmental Protection, Division of Fish and Wildlife. Trenton, N.J.	☐	☑	☑
Eastern Brook Trout Joint Venture Conservation Strategy/Habitat Work Group. 2011, January. Conserving the Eastern Brook Trout. Available from http://easternbrooktrout.org/reports/ebtjv-conservation-strategy/view (accessed February 2016).	☐	☑	☑
Bowers-Altman, J. 2016. Species Status Review of Freshwater Fishes (Draft). New Jersey Dept. of Environmental Protection, Division of Fish and Wildlife, Endangered and Nongame Species Program. Trenton, N.J.	☑	☑	☐

Comely Shiner

Notropis amoenus

The Comely Shiner is a medium-sized minnow reaching 4 inches. This stream-lined, silver-colored minnow is relatively indistinct, that is often identified by its signature "anchor shaped" pigment on the underside of its chin. Found in Atlantic sloped drainages from North Carolina to New York, their status is Threatened or very rare in the neighboring states of Delaware, Maryland, and New York. They have a scattered distribution in New Jersey, found in the Delaware River and a few of its tributaries from Gloucester to Sussex County and within the Raritan watershed. Found in only 1% of more than 2000 fisheries surveys conducted since the year 2000, this fish is almost always found in low abundance. Comely Shiners are found in runs and flowing pools, over sand and gravel, in medium to large rivers. It is considered sensitive to environmental degradation, primarily pollution, and siltation of spawning habitat. Although this species seems to coexist with non-native fishes in larger river systems, when found in smaller streams it is almost always found as part of a native fish assemblage, absent the presence of non-native species.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Fish

Taxa Sub Group: Freshwater Fish

Species Group:

Guild Group: Vulnerable Minnows

Conservation Target: Vulnerable Minnows

Conservation Status

State:

S_Rank: S4

Federal:

G_Rank: G5

Population Status

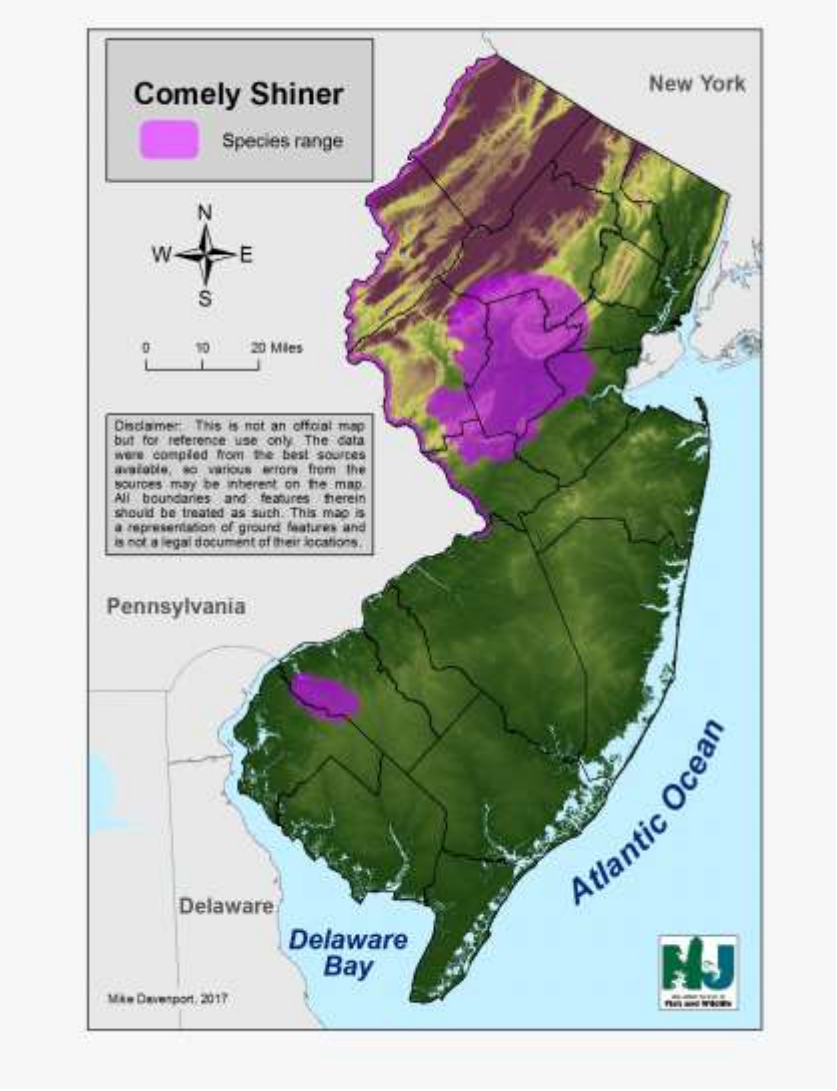
Abundance: Rare

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Warmwater Stream	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
			X		X

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Arndt, R.J. 2004. Annotated Checklist and Distribution of New Jersey Freshwater Fishes, With Comments on Abundance. The Bulletin: New Jersey Academy of Science: 49(1):1-34.	☑	☐	☐
Bowers-Altman, J. 2016. Species Status Review of Freshwater Fishes (Draft). New Jersey Dept. of Environmental Protection, Division of Fish and Wildlife, Endangered and Nongame Species Program. Trenton, N.J.	☑	☑	☐
New Jersey Division of Fish and WIldlife FishTrack Database. 2015. Trenton, N.J.	☑	☑	☐

Ironcolor Shiner

Notropis chalybaeus

The Ironcolor Shiner is a slender 2-inch minnow with a dark and thick lateral band extending from the base of the tail to the snout, and into the lower jaw, with olive coloration above and white below, closely resembling the Bridle Shiner. This species has declined throughout its range along the Atlantic coast and is possibly the rarest native freshwater fish in New Jersey, which is near the northern extent of its range. In New Jersey they have been reduced to two disjunct locations, separated by approximately 50 miles. As a sight feeder, this minnow prefers clear heavily vegetated pools over a sand bottom within ponds and slow moving streams and can tolerate moderate acidity. Primary threats to this species include habitat alteration affecting vegetation and water quality and predation from non-native fish species.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Fish

Taxa Sub Group: Freshwater Fish

Species Group:

Guild Group: Vulnerable Minnows

Conservation Target: Vulnerable Minnows

Conservation Status

State:

S_Rank: S1S2

Federal:

G_Rank: G4

Population Status

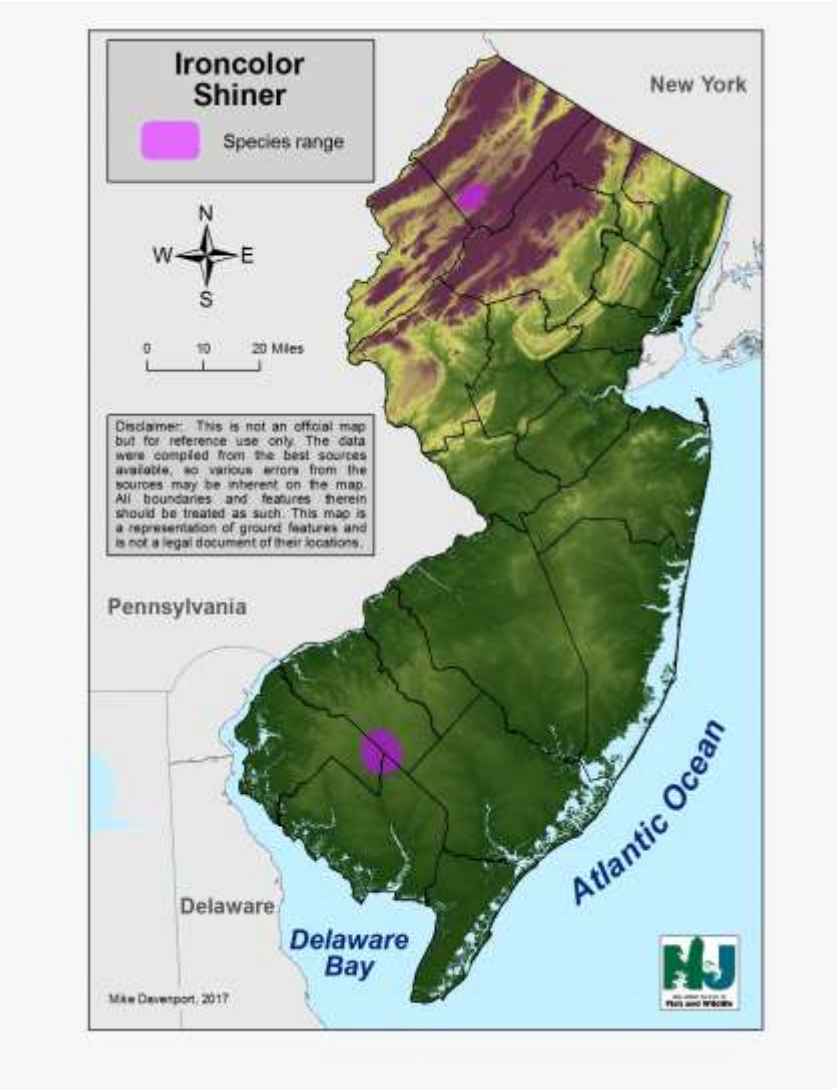
Abundance: Extremely Rare

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Coldwater Stream	X
Marine Nearshore Zone	X
Warmwater Stream	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
		X	X	X	X

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Jelks, H.L. et al. 2008. Conservation Status of Imperiled North American Freshwater and Diadromous Fishes. Fisheries 33(8):372-407.	☐	☑	☐
Arndt, R.J. 2004. Annotated Checklist and Distribution of New Jersey Freshwater Fishes, With Comments on Abundance. The Bulletin: New Jersey Academy of Science: 49(1):1-34.	☑	☐	☐
New Jersey Division of Fish and WIldlife FishTrack Database. 2015. Trenton, N.J.	☑	☑	☐
Bowers-Altman, J. 2016. Species Status Review of Freshwater Fishes (Draft). New Jersey Dept. of Environmental Protection, Division of Fish and Wildlife, Endangered and Nongame Species Program. Trenton, N.J.	☑	☑	☐

Mud Sunfish

Acantharchus pomotis

The Mud Sunfish is one of the larger native sunfish, reaching 8 inches. This dark brown fish is marked with approximately six indistinct lateral bands and has a rounded tail. Found along the Atlantic Coast from Florida to New York, its distribution in New Jersey is primarily limited to the Outer Coastal Plain, with rare occurrences in the central and northern portions of the state. Similar to other native fishes in the Pinelands, the naturally acidic water hinders the ability of non-native fishes such as Largemouth Bass, Bluegill, and Crappie to establish significant populations, due to their reduced ability to spawn in waters with a pH of less than 5. The Mud Sunfish prefers forested ponds and sluggish streams and were found in 45% of surveys conducted within the Pinelands since 2000. Threats to Mud Sunfish include land-use changes that impact water quality resulting in increased pH and nutrient load, loss of native aquatic vegetation, and competition and predation exhorted by non-native fishes.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Fish

Taxa Sub Group: Freshwater Fish

Species Group:

Guild Group: Pinelands Freshwater Fish

Conservation Target: Pinelands Freshwater Fish

Conservation Status

State:

S_Rank: S4

Federal:

G_Rank: G5

Population Status

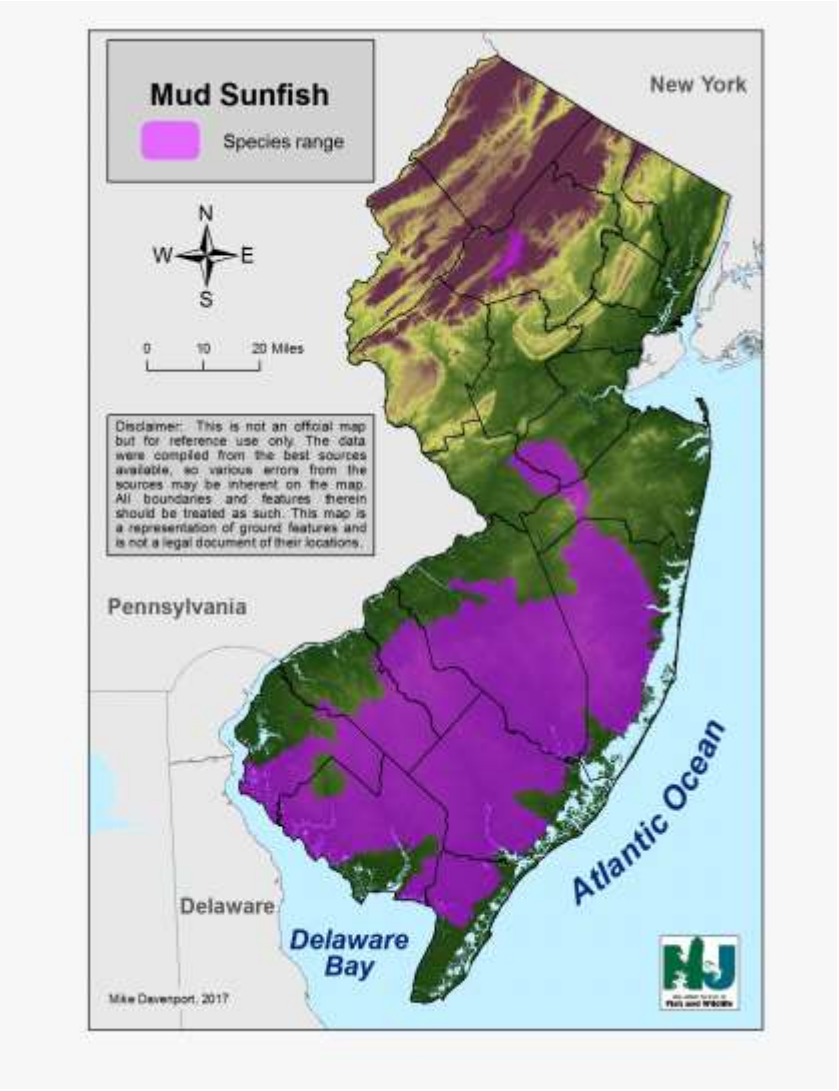
Abundance: Uncommon

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Marine Nearshore Zone	X
Marine Offshore Zone	X
Warmwater Stream	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
		X	X	X	x

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Bowers-Altman, J. 2016. Species Status Review of Freshwater Fishes (Draft). New Jersey Dept. of Environmental Protection, Division of Fish and Wildlife, Endangered and Nongame Species Program. Trenton, N.J.	☑	☑	☐
New Jersey Division of Fish and WIldlife FishTrack Database. 2015. Trenton, N.J.	☑	☑	☐
Arndt, R.J. 2004. Annotated Checklist and Distribution of New Jersey Freshwater Fishes, With Comments on Abundance. The Bulletin: New Jersey Academy of Science: 49(1):1-34.	☑	☐	☐

Shortnose Sturgeon

Acipenser brevirostrum

A primitive anadromous bony fish native to the east coast of North America. Characterized by a gray, round, elongate body covered in rows of bony scutes and having mandibular barbels. A bottom-feeder inhabiting the riverine, marine, and intermediate habitats. Generally smaller than Atlantic Sturgeon, longer-lived, and possess a differently structured snout. A member of the Federal Endangered species list.

SWAP Classification

Broad Group: Estuarine Wildlife

Taxon: Fish

Taxa Sub Group: Marine Fish

Species Group:

Guild Group: Anadromous & Semi-anadromous Fish

Conservation Target: Anadromous & Semi-anadromous Fish

Conservation Status

State: E

S_Rank: S1

Federal:

G_Rank: G3

Population Status

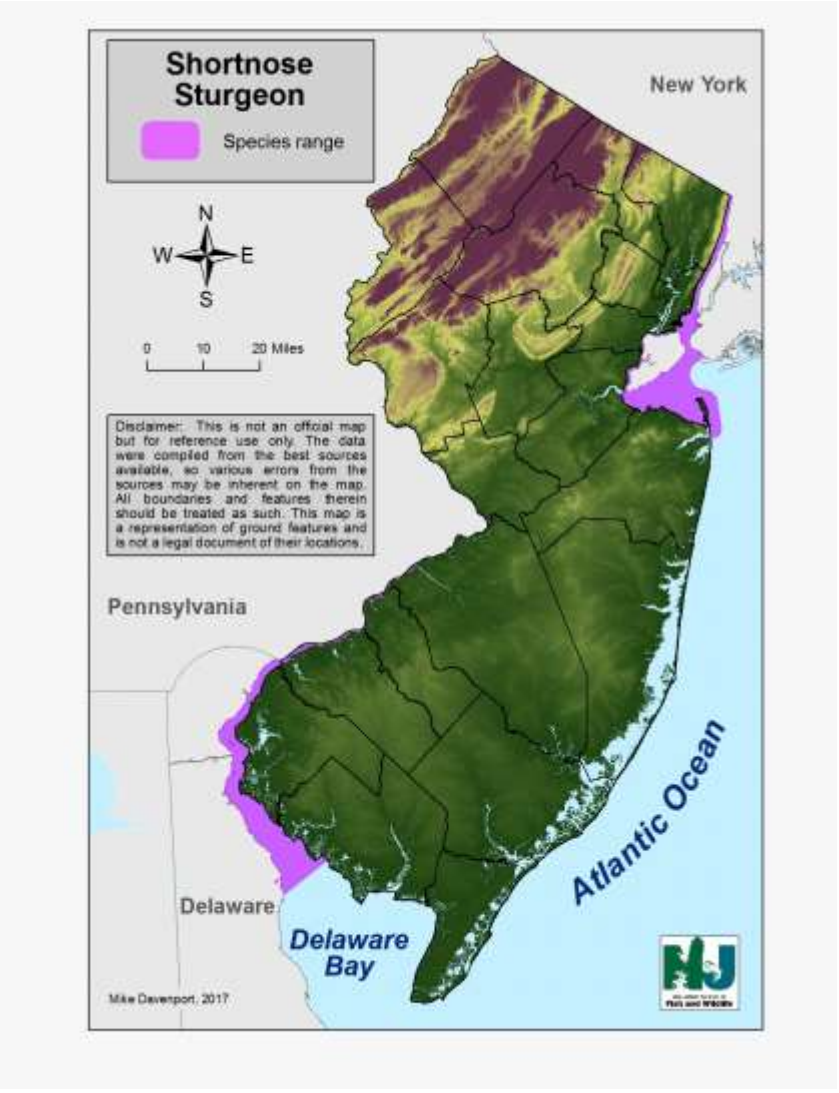
Abundance: Uncommon

Trend: Unknown

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Marine Nearshore Zone	X
Marine Offshore Zone	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
x	x	x	x		

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☐	☐
U.S. Fish and Wildlife Service. 1967. Federal endangered species listed 1967. Available from http://www.nmfs.noaa.gov/pr/species/esa/listed.htm (accessed January 2016).	☐	☐	☑
National Marine Fisheries Service. 1998. Final Recovery Plan For the Shortnose Sturgeon. NOAA Office of Protected Resources, Silver Spring, MD. Available from http://www.nmfs.noaa.gov/pr/pdfs/recovery/sturgeon_shortnose.pdf (accessed February 2016).	☐	☐	☑
National Marine Fisheries Service. 2014. Shortnose Sturgeon. NOAA Office of Protected Resources, Silver Spring, MD. Available from http://www.nmfs.noaa.gov/pr/species/fish/shortnosesturgeon.htm (accessed February 2016).	☑	☑	☐

Swamp Darter

Etheostoma fusiforme

The Swamp Darter is the smallest of the three native darter species in New Jersey, rarely exceeding 2 inches in length, with a girth no more than a centimeter. Found primarily from Louisiana up the Mississippi drainage, northeastward to southern Maine, it is currently listed as Special Concern or Threatened in several states in the northeast. This lowland species has not been documented in New Jersey's Inner Coastal Plain in recent years and like several other native fishes, seems relegated to the Pinelands, where it is abundant. It is found in standing or slow-moving water over mud, sand, or detritus, often associated with submerged vegetation. Individuals mature at age one and rarely live past their second summer. Although not considered to be particularly environmentally sensitive, water quality changes that favor non-native predators may significantly impact the Swamp Darter.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Fish

Taxa Sub Group: Freshwater Fish

Species Group:

Guild Group: Pinelands Freshwater Fish

Conservation Target: Pinelands Freshwater Fish

Conservation Status

State:

S_Rank: S4

Federal:

G_Rank: G5

Population Status

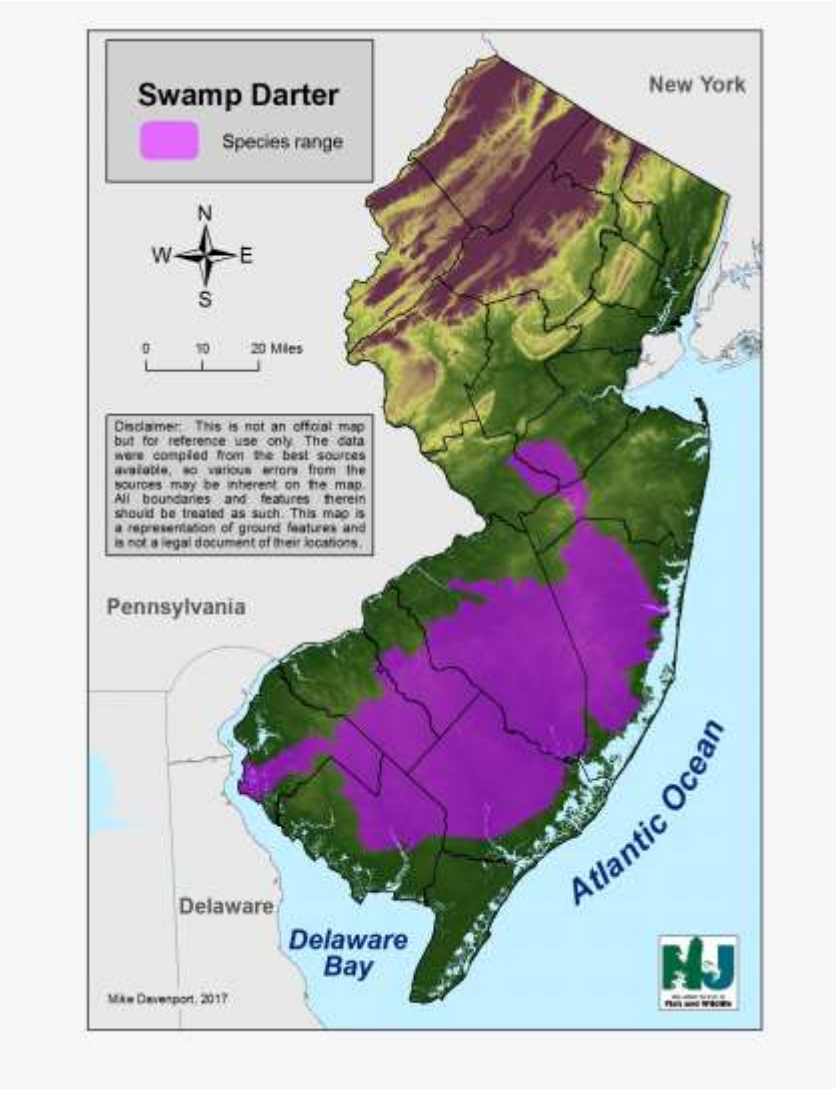
Abundance: Uncommon

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Warmwater Stream	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
		X	x	X	

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Arndt, R.J. 2004. Annotated Checklist and Distribution of New Jersey Freshwater Fishes, With Comments on Abundance. The Bulletin: New Jersey Academy of Science: 49(1):1-34.	☑	☐	☐
New Jersey Division of Fish and WIldlife FishTrack Database. 2015. Trenton, N.J.	☑	☑	☐
Bowers-Altman, J. 2016. Species Status Review of Freshwater Fishes (Draft). New Jersey Dept. of Environmental Protection, Division of Fish and Wildlife, Endangered and Nongame Species Program. Trenton, N.J.	☑	☑	☐

Macroinvertebrates

A Notodontid Moth (H. varia)

Heterocampa varia

Heterocampa varia is a species of notodontid moth that occurs in the pine-scrub oak habitats found within the New Jersey Pinelands Region. The larvae feed on a variety of mature oak leaves. This species is largely threatened by the alteration of the natural fire and disturbance regimes that it depends on for maintenance of its habitats.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Macroinvertebrates

Taxa Sub Group: Terrestrial Invertebrates

Species Group: Leptidoptera

Guild Group: Moths

Conservation Target: Pinelands Moths

Conservation Status

State:

S_Rank: S3

Federal:

G_Rank: G3G4

Population Status

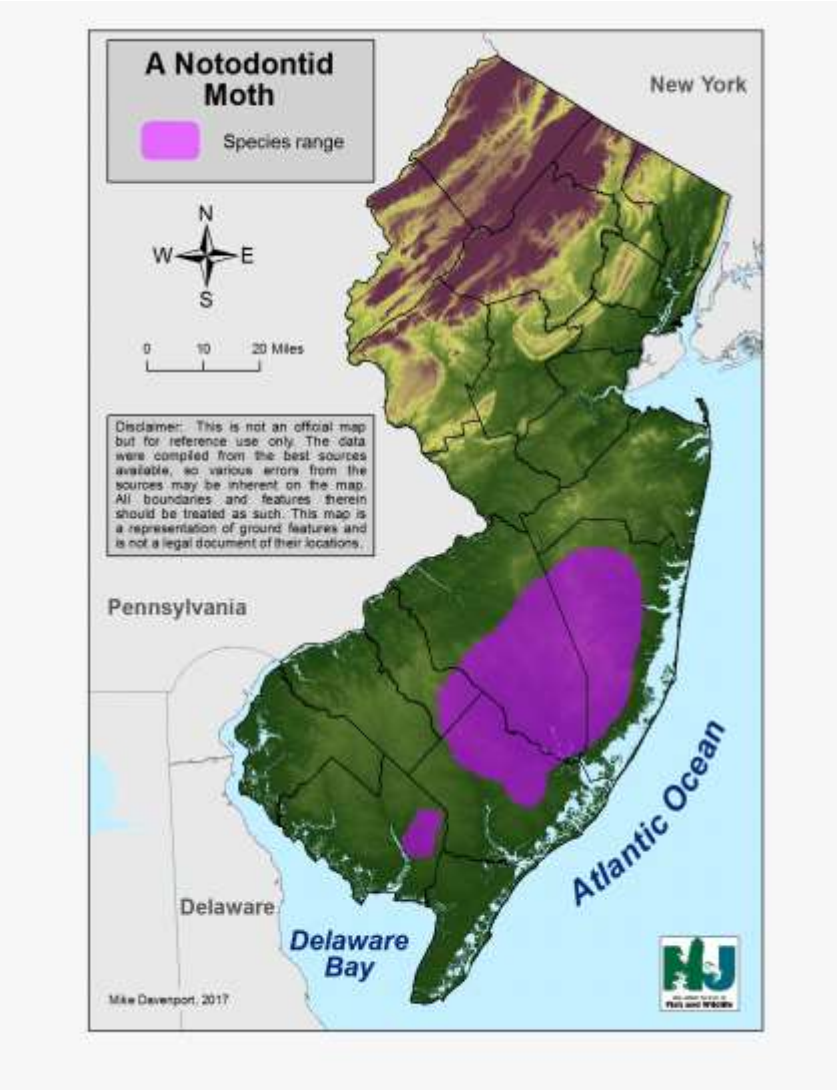
Abundance: Common

Trend: Stable

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Forest	X
Shrub	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
		x		x	

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Schweitzer, D.F., M.C. Minnow, and D.L. Wagner. 2014. Rare, Declining, and Poorly Known Butterflies and Moths of Forests and Woodlands in the Eastern United States. USDA Forest Service. Morgantown, W.V.	☑	☑	☐

American Bumble Bee

Bombus pensylvanicus

The American Bumble Bee is a widespread species of bumble bee that inhabits a wide variety of grassland and farmland habitats and nests mostly above ground among tall grasses but will also nest underground. This species is found throughout NJ but has been suffering a gradual decline in the northern parts of its range including NJ.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Macroinvertebrates

Taxa Sub Group: Terrestrial Invertebrates

Species Group:

Guild Group: Bumble Bees

Conservation Target: Bumble Bees

Conservation Status

State:

S_Rank:

Federal:

G_Rank:

Population Status

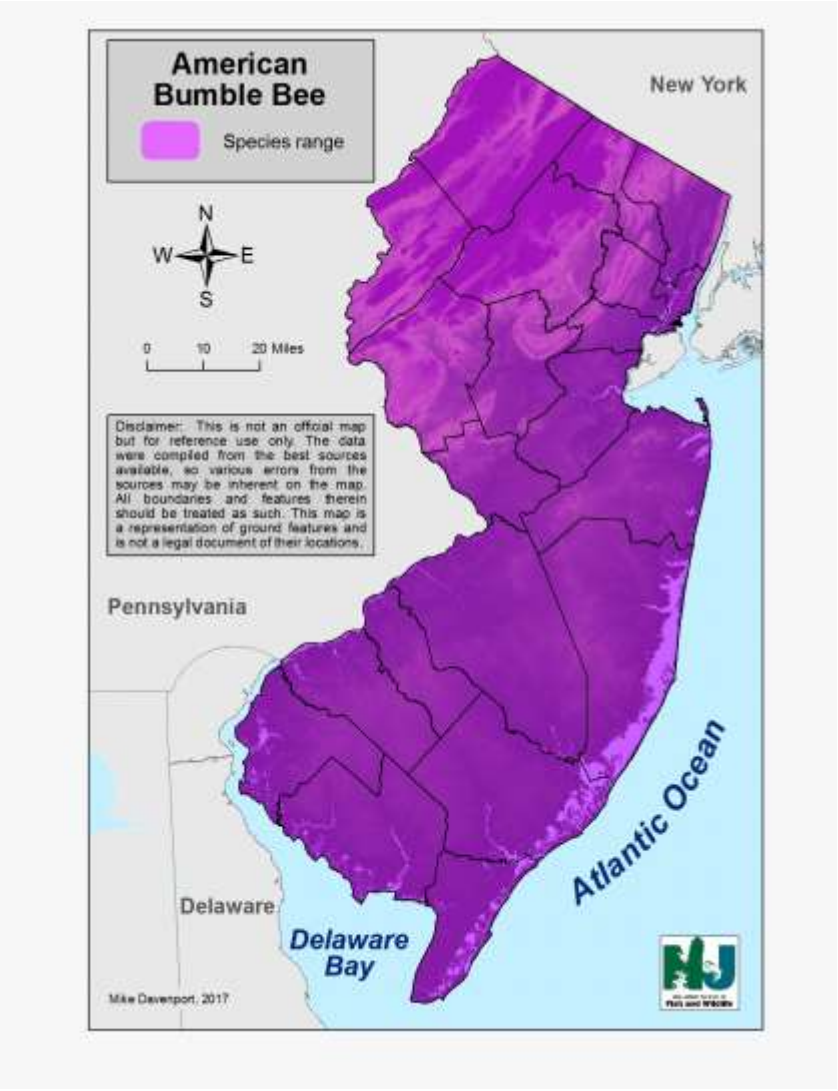
Abundance: Uncommon

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Forest	X
Grassland	X
Shrub	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
		x	x	x	x

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Williams, P., R. Thorp, L. Richardson, and S. Colla. 2014. An Identification Guide: Bumble Bees of North America. Princeton University Press. Princeton, N.J.	☑	☑	☐
Schweitzer, D.F., N.A. Capuano, B.E. Young, and S.R. Colla. 2012. Conservation and management of North American bumble bees. NatureServe, Arlington, Virginia, and USDA Forest Service, Washington, D.C. Available from https://www.fs.fed.us/wildflowers/pollinators/documents/ConsMgmtNABumbleBees.pdf	☐	☐	☑

Arogos Skipper

Atrytone arogos arogos

Arogos Skipper is a species of grass skipper and occurs in two disjunct and entirely different regions of New Jersey. There are two populations of Arogos Skipper in New Jersey, one in Morris County and the other in the Pinelands Region of southern NJ and concentrated in Ocean and Burlington Counties. It has a flight period that occurs during late June through mid-July in northern New Jersey and during late July through early August in southern New Jersey. The Morris County population depends on Little Blue Stem (Schizachyrium scoparium) as its larval food plant and is concentrated on the former Succasunna Sand Plains area around Kenvil and Succasunna. Here the primary habitat is xeric grasslands and fields. The populations of this species are largely threatened by the loss and fragmentation of its habitats by human development. The Pinelands population of this species occurs in the Pine Barrens Reed Grass Savannahs found within the Pinelands Region of New Jersey. Its host plant is Pine Barrens Reed Grass (Calamovifa brevipilis) that occurs in the wetter, fire impacted areas of the Pinelands Region. These populations are largely threatened by the alteration of the natural fire and disturbance regimes that it depends on for maintenance of its habitats. Alterations of the natural hydrology can also have an impact on these habitats.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Macroinvertebrates

Taxa Sub Group: Terrestrial Invertebrates

Species Group: Leptidoptera

Guild Group: Butterflies

Conservation Target: Arogos Skipper

Conservation Status

State: E

S_Rank: S1

Federal:

G_Rank: G3T1T2

Population Status

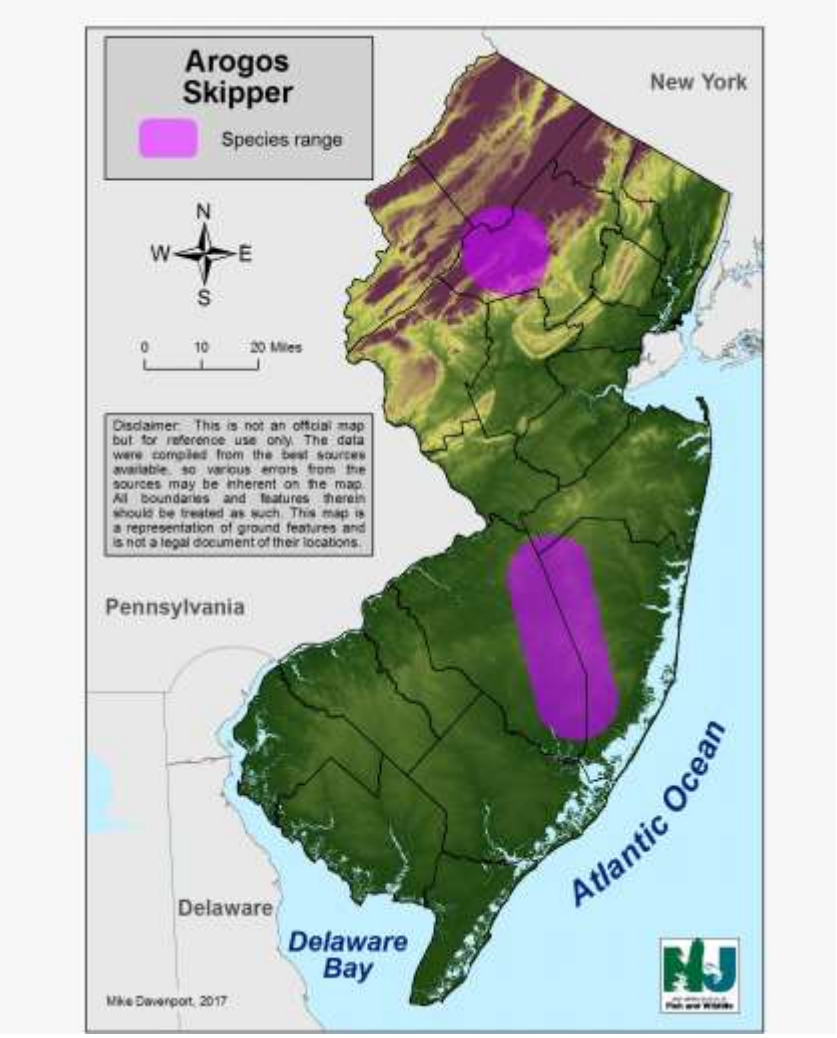
Abundance: Extremely Rare

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Grassland	X
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
			x	x	x

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Schweitzer, D.F., M.C. Minnow, and D.L. Wagner. 2014. Rare, Declining, and Poorly Known Butterflies and Moths of Forests and Woodlands in the Eastern United States. USDA Forest Service. Morgantown, W.V.	☑	☑	☐

Ashton Cuckoo Bumble Bee

Bombus bohemicus

The Ashton Cuckoo Bumble Bee is a northern species of bumble bee that is a nest parasite of other bumble bee species. It occurs in a wide variety of habitats in northern NJ and its decline is probably linked to the decline of its host bumble bee species.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Macroinvertebrates

Taxa Sub Group: Terrestrial Invertebrates

Species Group:

Guild Group: Bumble Bees

Conservation Target: Bumble Bees

Conservation Status

State:

S_Rank:

Federal:

G_Rank:

Population Status

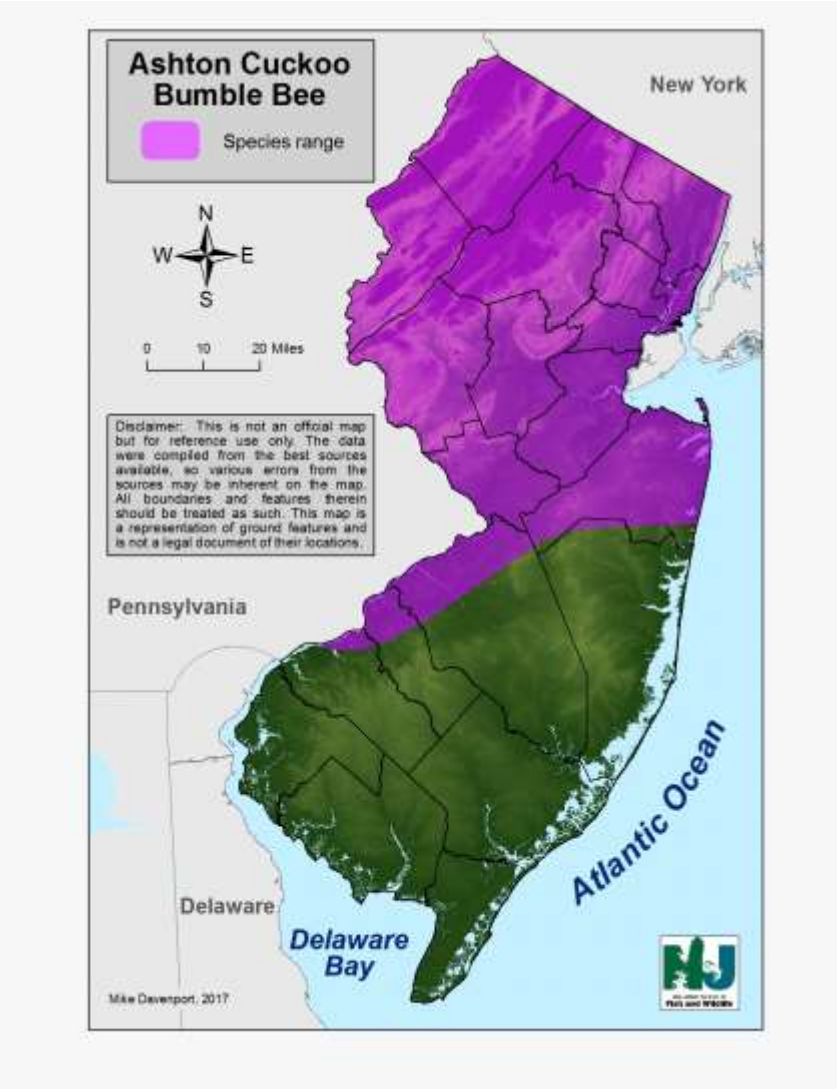
Abundance: Extremely Rare

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Forest	X
Grassland	X
Shrub	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
		x	x	x	x

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Schweitzer, D.F., N.A. Capuano, B.E. Young, and S.R. Colla. 2012. Conservation and management of North American bumble bees. NatureServe, Arlington, Virginia, and USDA Forest Service, Washington, D.C. Available from https://www.fs.fed.us/wildflowers/pollinators/documents/ConsMgmtNABumbleBees.pdf	☐	☐	☑
Williams, P., R. Thorp, L. Richardson, and S. Colla. 2014. An Identification Guide: Bumble Bees of North America. Princeton University Press. Princeton, N.J.	☑	☑	☐

Brook Floater

Alasmidonta varicosa

The Brook Floater is a State Endangered freshwater mussel species. It inhabits streams and smaller rivers, and is often associated with rapids or riffles on rock and fine gravel substrates. In NJ, Brook floaters occupy sections of the Stony Brook, Lamington, Raritan and Musconetcong Rivers, as well as the Flatbrook. Low population numbers may indicate that no new reproduction is occurring. As with most freshwater mussels, the Brook Floater requires particular host fish species to complete its life cycle. Population declines are tied to habitat destruction, water quality degradation, dam construction, and the invasion of exotic species.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Macroinvertebrates

Taxa Sub Group: Aquatic Invertebrates

Species Group: Mussels

Guild Group: Freshwater Mussels

Conservation Target: Freshwater Mussels

Conservation Status

State: E

S_Rank: S1

Federal:

G_Rank: G3

Population Status

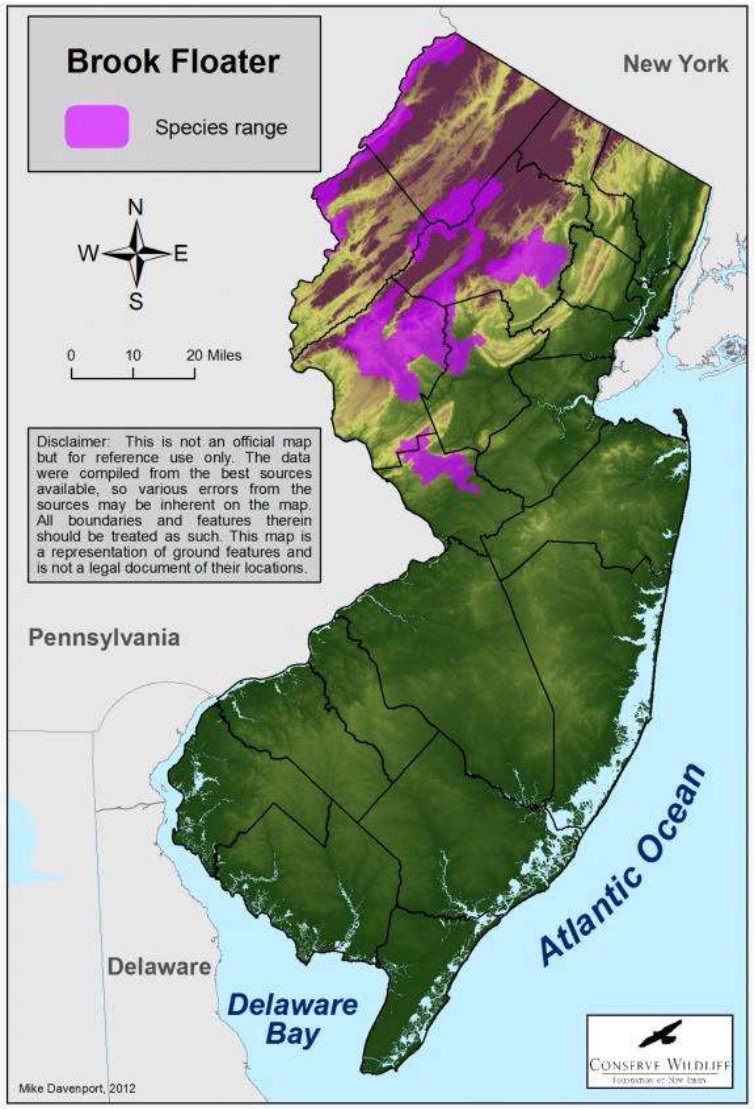
Abundance: Rare

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Coldwater Stream	X
Warmwater Stream	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
			x		x

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Davenport, M. 2012. Species Status Review of Freshwater Mussels. Results Report for the NJ Endangered and Nongame Species Advisory Committee. Conserve Wildlife Foundation of New Jersey. Trenton, N.J.	☑	☑	☐
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☑	☐
National Mussel Conservation Committee. 1998. National strategy for the conservation of native freshwater mussels. Journal of Shellfish Research 17(5):1419-1428.	☐	☐	☑

Buchholz's Dart Moth

Agrotis buchholzi

Buchholz's Dart Moth is a species of noctuid moth that occurs in the pitch pine-oak scrub and pitch pine lowland habitats found within the New Jersey Pinelands Region and is an endemic species to this region. Its larval host plant is Pixie Moss (Pyxidanthera barbulata). This species is largely threatened by the alteration of the natural fire and disturbance regimes that it depends on for maintenance of its habitats.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Macroinvertebrates

Taxa Sub Group: Terrestrial Invertebrates

Species Group: Leptidoptera

Guild Group: Moths

Conservation Target: Pinelands Moths

Conservation Status

State:

S_Rank: S2

Federal:

G_Rank: G2

Population Status

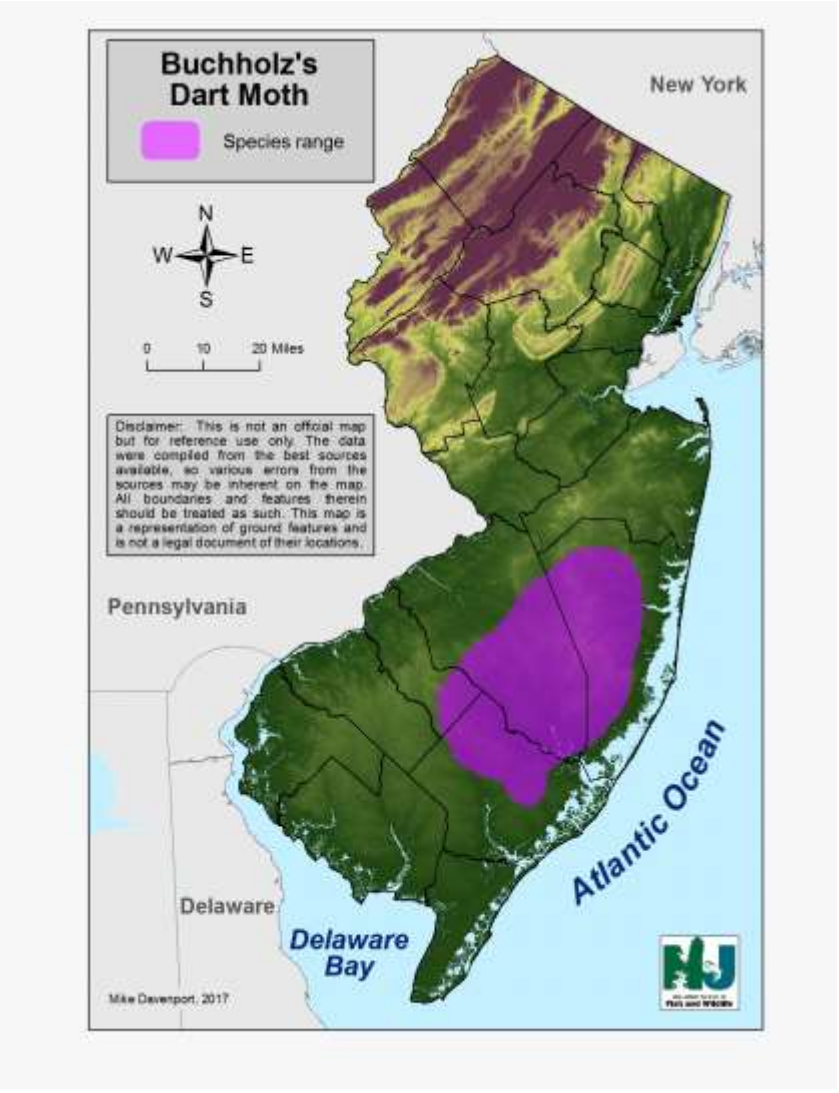
Abundance: Rare

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Forest	X
Shrub	X
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
				x	

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Schweitzer, D.F., M.C. Minnow, and D.L. Wagner. 2014. Rare, Declining, and Poorly Known Butterflies and Moths of Forests and Woodlands in the Eastern United States. USDA Forest Service. Morgantown, W.V.	☑	☑	☐

Buchholz's Gray

Hypomecis buchholzaria

Buchholz's Gray is a species of Geometridae moth that occurs in the northern portion of the New Jersey Pinelands Region. Its larvae feed on Sweet Fern (Comptonia peregrina) and Bear Oak (Quercus ilicifolia). This species is largely threatened by the alteration of the natural fire and disturbance regimes that it depends on for maintenance of its habitats.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Macroinvertebrates

Taxa Sub Group: Terrestrial Invertebrates

Species Group: Leptidoptera

Guild Group: Moths

Conservation Target: Pinelands Moths

Conservation Status

State:

S_Rank: S3

Federal:

G_Rank: G3G4

Population Status

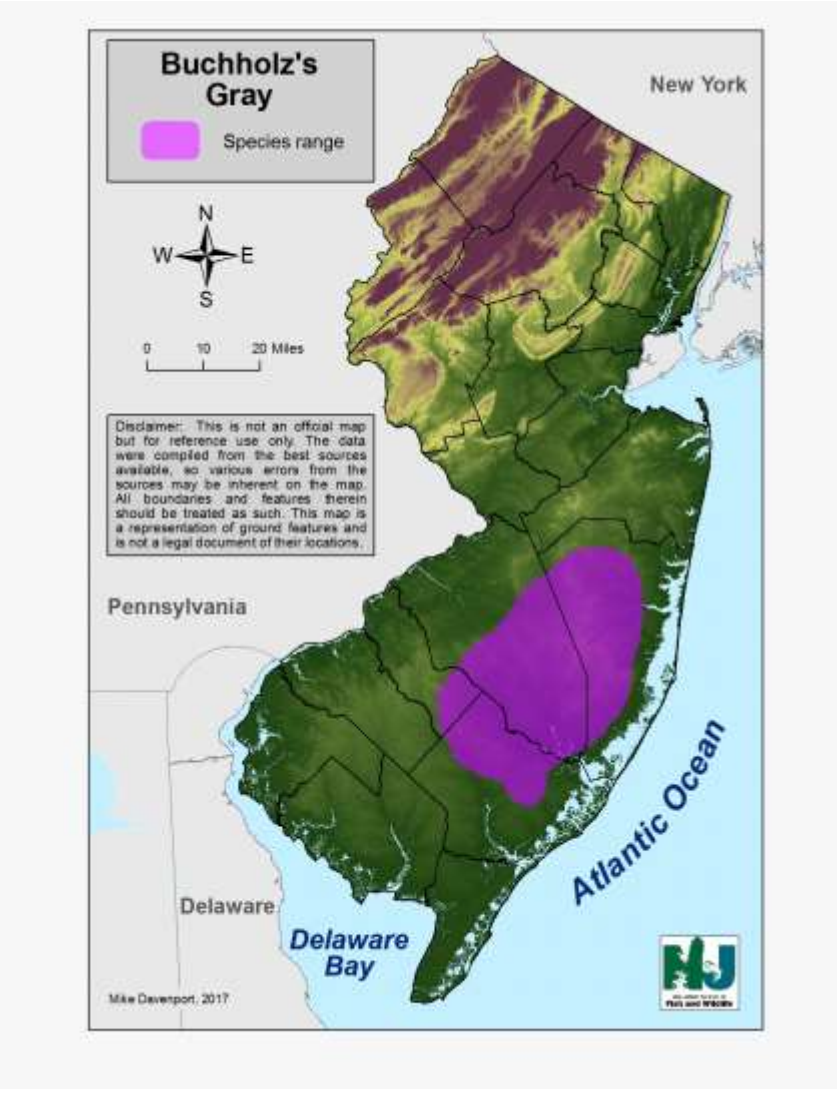
Abundance: Rare

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Forest	X
Shrub	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
		x		x	

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Schweitzer, D.F., M.C. Minnow, and D.L. Wagner. 2014. Rare, Declining, and Poorly Known Butterflies and Moths of Forests and Woodlands in the Eastern United States. USDA Forest Service. Morgantown, W.V.	☑	☑	☐

Carter's Noctuid Moth

Spartiniphaga carterae

Carter's Noctuid Moth is a species of noctuid moth that occurs in the Pine Barrens Reed Grass Savannahs found within the Pinelands Region of New Jersey. Its host plant is Pine Barrens Reed Grass (Calamovifa brevipilis). This species is largely threatened by the alteration of the natural fire and disturbance regimes that it depends on for maintenance of its habitats.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Macroinvertebrates

Taxa Sub Group: Terrestrial Invertebrates

Species Group: Leptidoptera

Guild Group: Moths

Conservation Target: Pinelands Moths

Conservation Status

State:

S_Rank: S2

Federal:

G_Rank: G2G3

Population Status

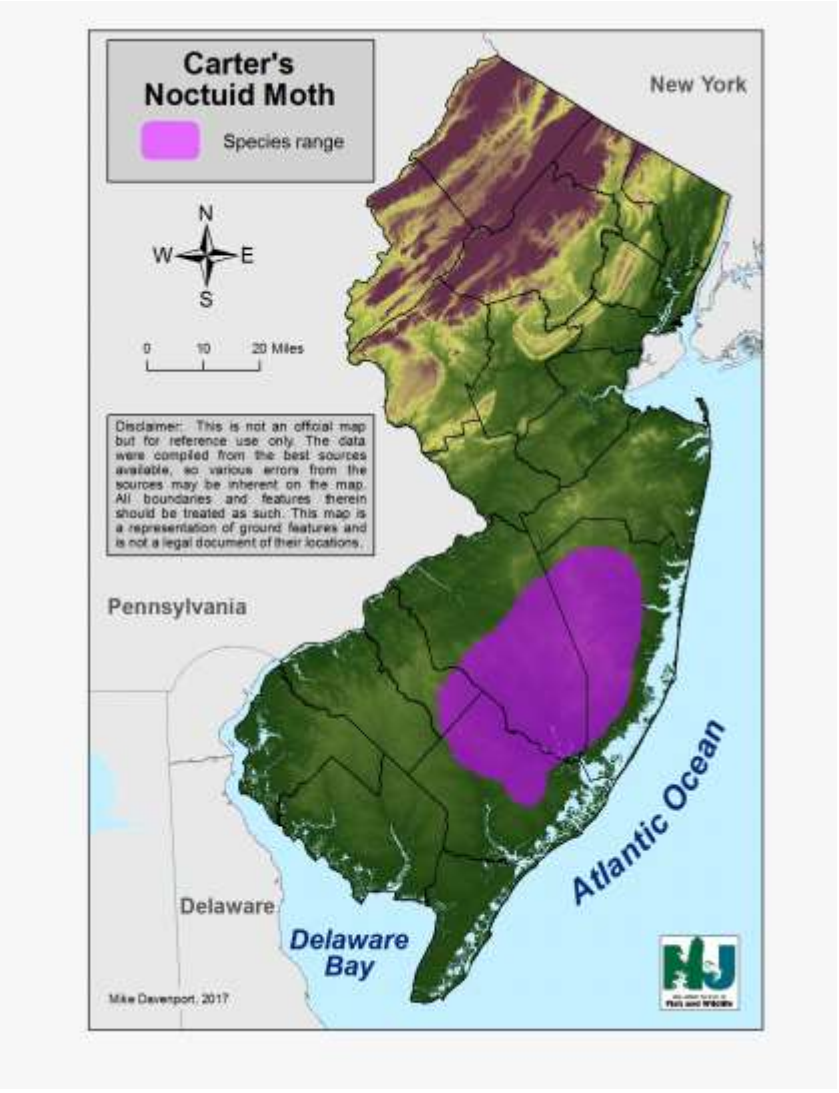
Abundance: Rare

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Forest	X
Grassland	X
Shrub	X
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
				x	

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Schweitzer, D.F., M.C. Minnow, and D.L. Wagner. 2014. Rare, Declining, and Poorly Known Butterflies and Moths of Forests and Woodlands in the Eastern United States. USDA Forest Service. Morgantown, W.V.	☑	☑	☐

Daecke's Pyralid Moth

Crambus daeckellus

Daecke's Pyralid Moth is a species of Crambiae moth that occurs in the New Jersey Pinelands Region and is found in pitch pine lowlands and Pine Barrens Reed Grass Savannahs. Expert opinion is that this species feeds on the roots of Eastern Turkeybeard (Xerophyllum asphodeloides). This species is largely threatened by the alteration of the natural fire and disturbance regimes that it depends on for maintenance of its habitats.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Macroinvertebrates

Taxa Sub Group: Terrestrial Invertebrates

Species Group: Leptidoptera

Guild Group: Moths

Conservation Target: Pinelands Moths

Conservation Status

State:

S_Rank: S1S3

Federal:

G_Rank: G1G3

Population Status

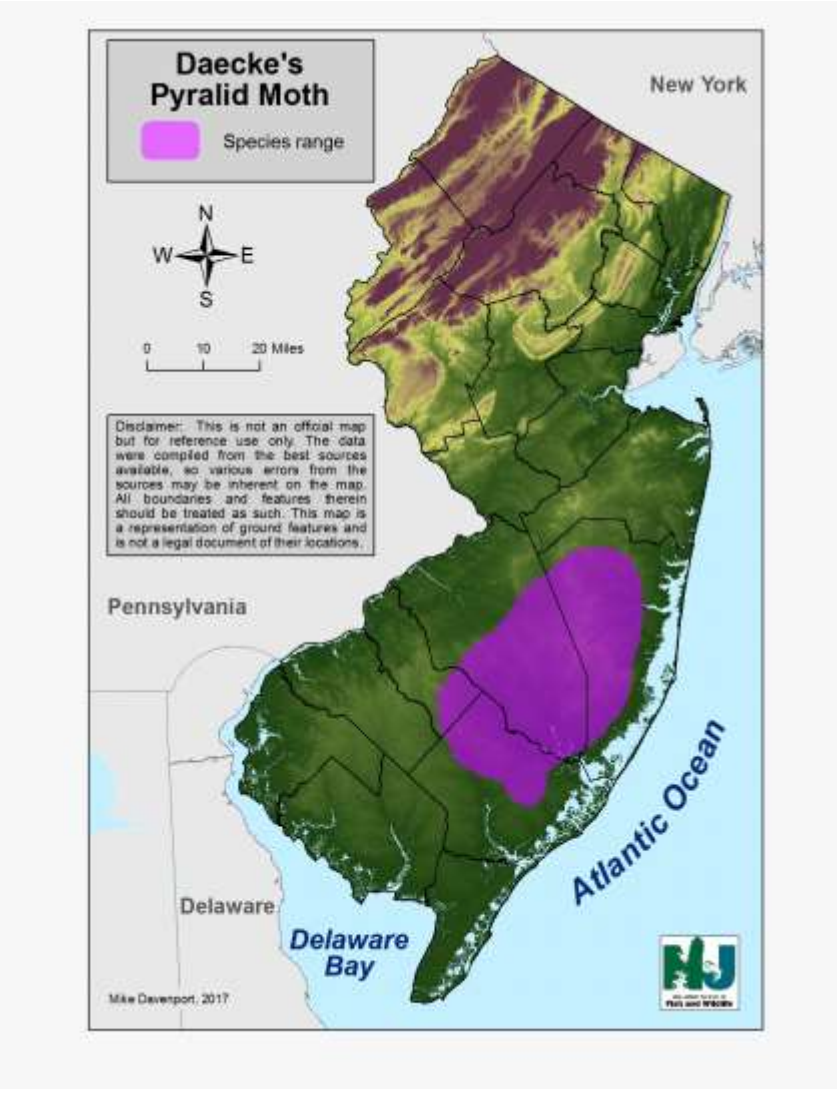
Abundance: Rare

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Forest	X
Grassland	X
Shrub	X
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
				x	

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Schweitzer, D.F., M.C. Minnow, and D.L. Wagner. 2014. Rare, Declining, and Poorly Known Butterflies and Moths of Forests and Woodlands in the Eastern United States. USDA Forest Service. Morgantown, W.V.	☑	☑	☐

Dotted Skipper

Hesperia attalus slossonae

The Dotted Skipper is a species of grass skipper occurs in the Pinelands Region of New Jersey and is found in open, grassy habitats containing stands of Little Blue Stem (Schizachyrium scoparium), its larval host plant. This species is largely threatened by the alteration of the natural fire and disturbance regimes that it depends on for maintenance of its habitats.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Macroinvertebrates

Taxa Sub Group: Terrestrial Invertebrates

Species Group: Leptidoptera

Guild Group: Butterflies

Conservation Target: Dotted Skipper

Conservation Status

State: SC

S_Rank: S3

Federal:

G_Rank: G3G4T3

Population Status

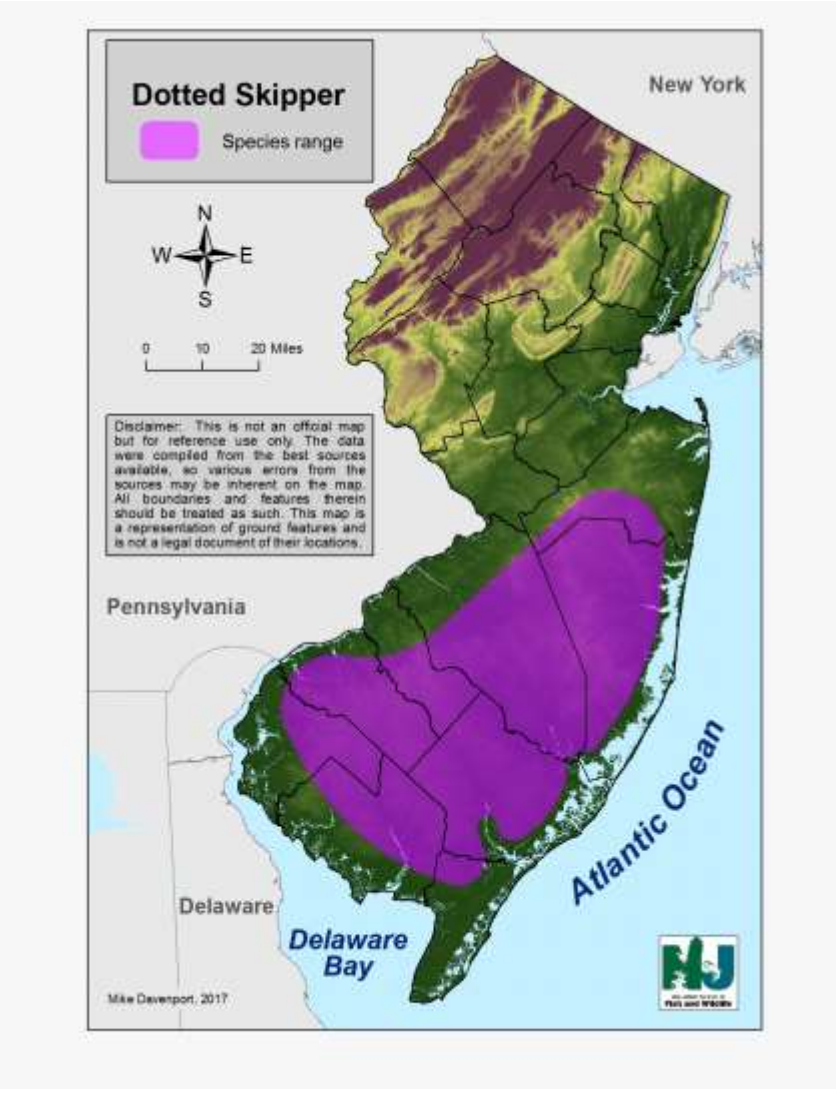
Abundance: Rare

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Grassland	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
		x		x	

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Schweitzer, D.F., M.C. Minnow, and D.L. Wagner. 2014. Rare, Declining, and Poorly Known Butterflies and Moths of Forests and Woodlands in the Eastern United States. USDA Forest Service. Morgantown, W.V.	☑	☑	☐

Dwarf Wedgemussel

Alasmidonta heterodon

The Dwarf Wedgemussel is both a Federal and State Endangered species. It is a rare freshwater mussel found in streams and rivers that prefers sandy substrates with slow to moderate currents. In NJ, this includes areas within the upper Delaware River, Flat Brook, sections of the Paulins Kill, and the Pequest River where their presence has been documented. Like most freshwater mussels, the Dwarf Wedgemussel requires particular host fish species to complete its life cycle. Due in part to habitat destruction, water quality degradation, overcollection, and interruption of fish hosts, this species has suffered population losses throughout the northeast and middle Atlantic Region of the US in the last century.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Macroinvertebrates

Taxa Sub Group: Aquatic Invertebrates

Species Group: Mussels

Guild Group: Freshwater Mussels

Conservation Target: Freshwater Mussels

Conservation Status

State: E

S_Rank: S1

Federal:

G_Rank: G1G2

Population Status

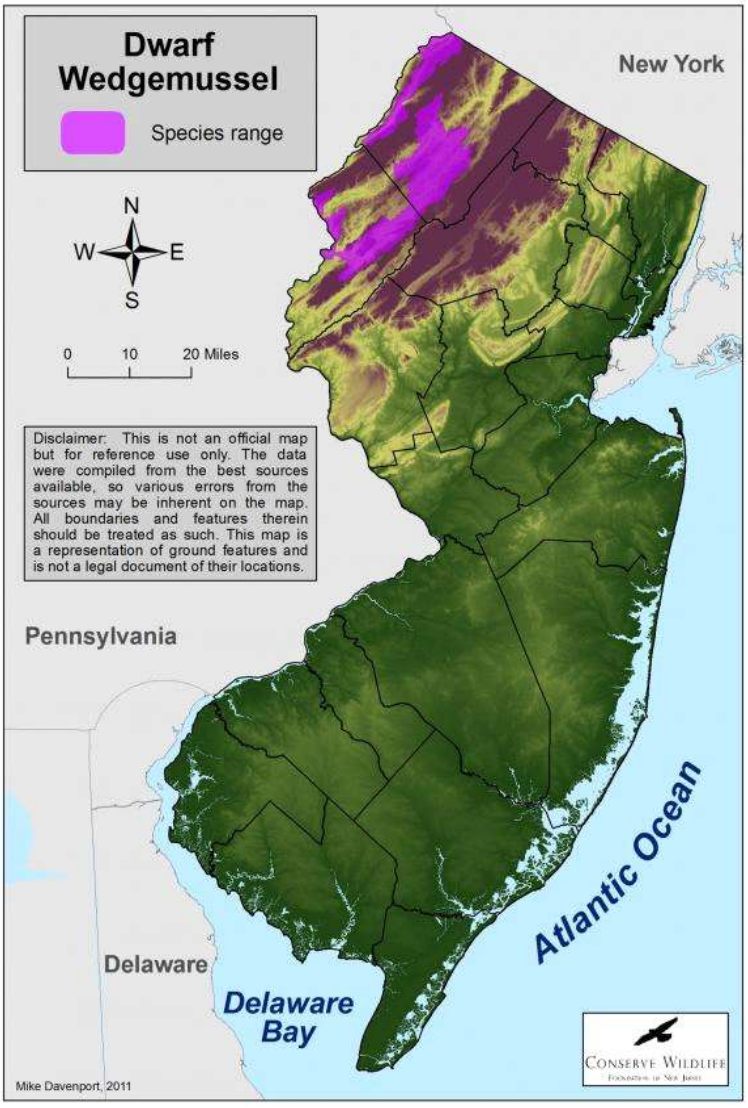
Abundance: Rare

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Coldwater Stream	X
Warmwater Stream	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
					x

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
National Mussel Conservation Committee. 1998. National strategy for the conservation of native freshwater mussels. Journal of Shellfish Research 17(5):1419-1428.	☐	☐	☑
U.S. Fish and Wildlife Service. 1993. Dwarf Wedge Mussel (Alasmidonta heterodon) Recovery Plan. USFWS, Hadley, M.A. 52 pp. Available from http://www.fws.gov/northeast/pafo/pdf/Dwarf%20wedgemussel%20Recovery%20Plan.pdf (accessed January 2016).	☐	☐	☑
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☑	☐
Davenport, M. 2012. Species Status Review of Freshwater Mussels. Results Report for the NJ Endangered and Nongame Species Advisory Committee. Conserve Wildlife Foundation of New Jersey. Trenton, N.J.	☑	☑	☐

Eastern Lampmussel

Lampsilis radiata

The Eastern Lampmussel is a State Threatened freshwater mussel species. It can be found in a variety of habitats in medium to coarse sandy substrates. In NJ, the species has been reported in the Paulins Kill, Kymer Brook, Ramapo, Pequannock, Wallkill, and Whippany Rivers as well as several lakes. As with most freshwater mussels, the Eastern Lampmussel requires particular host fish species to complete its life cycle. Threats to populations include habitat destruction, water quality degradation, dam construction and the invasion of exotic species.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Macroinvertebrates

Taxa Sub Group: Aquatic Invertebrates

Species Group: Mussels

Guild Group: Freshwater Mussels

Conservation Target: Freshwater Mussels

Conservation Status

State: T

S_Rank: S2

Federal:

G_Rank: G5

Population Status

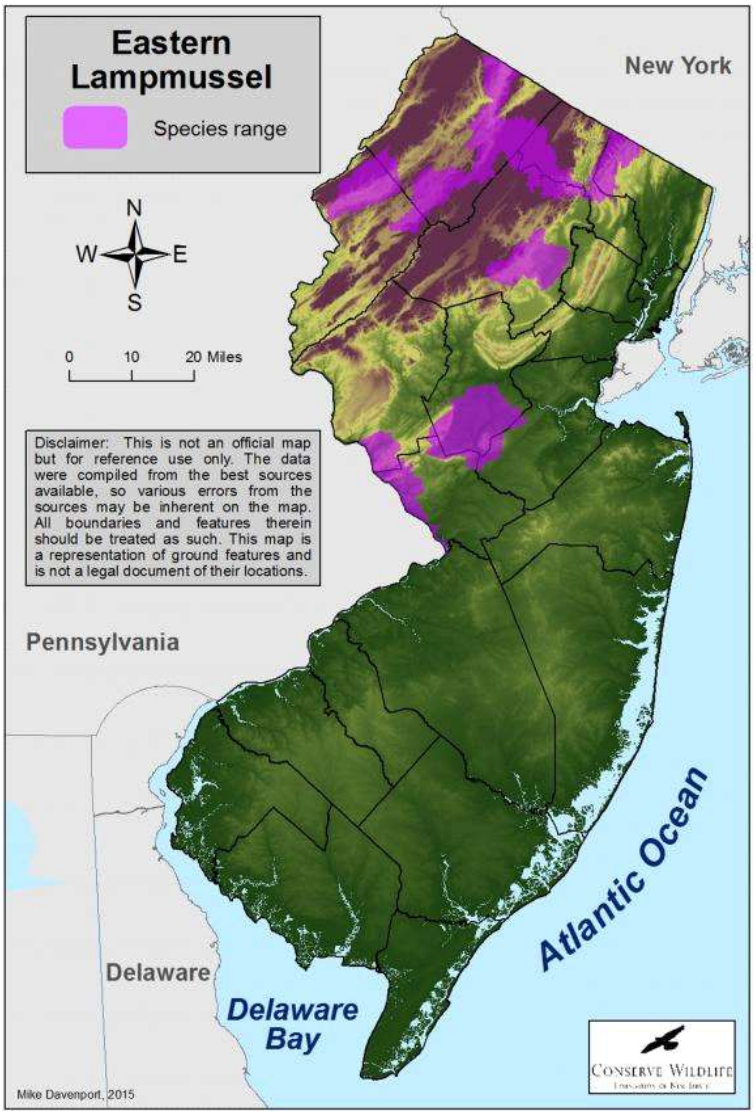
Abundance: Uncommon

Trend: Unknown

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Coldwater Stream	X
Warmwater Stream	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
			x		x

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☑	☐
Davenport, M. 2012. Species Status Review of Freshwater Mussels. Results Report for the NJ Endangered and Nongame Species Advisory Committee. Conserve Wildlife Foundation of New Jersey. Trenton, N.J.	☑	☑	☐
National Mussel Conservation Committee. 1998. National strategy for the conservation of native freshwater mussels. Journal of Shellfish Research 17(5):1419-1428.	☐	☐	☑

Frosted Elfin

Callophrys irus

The Frosted Elfin is species of hairstreak butterfly that historically occurred throughout the state of NJ but is now largely restricted to Atlantic, Cape May, and Cumberland Counties. It occurs in a wide variety of open habitats and is found mostly in pine and oak barrens and open grassland/savannah areas where its host plant, Wild Indigo (primarily Baptisia tinctoria in NJ) occurs. These areas often include utility right-of-ways and airports. It should be noted that this species of butterfly also uses several species of Lupine as a larval host plant in some portions of its range including areas just north of New Jersey in NY and MA. This species requires disturbance for the maintenance of stands of its host plant and is threatened by alteration of the natural fire regimes that it depends on for maintenance of its habitats.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Macroinvertebrates

Taxa Sub Group: Terrestrial Invertebrates

Species Group: Leptidoptera

Guild Group: Butterflies

Conservation Target: Frosted Elfin

Conservation Status

State: T

S_Rank: S2

Federal:

G_Rank: G3

Population Status

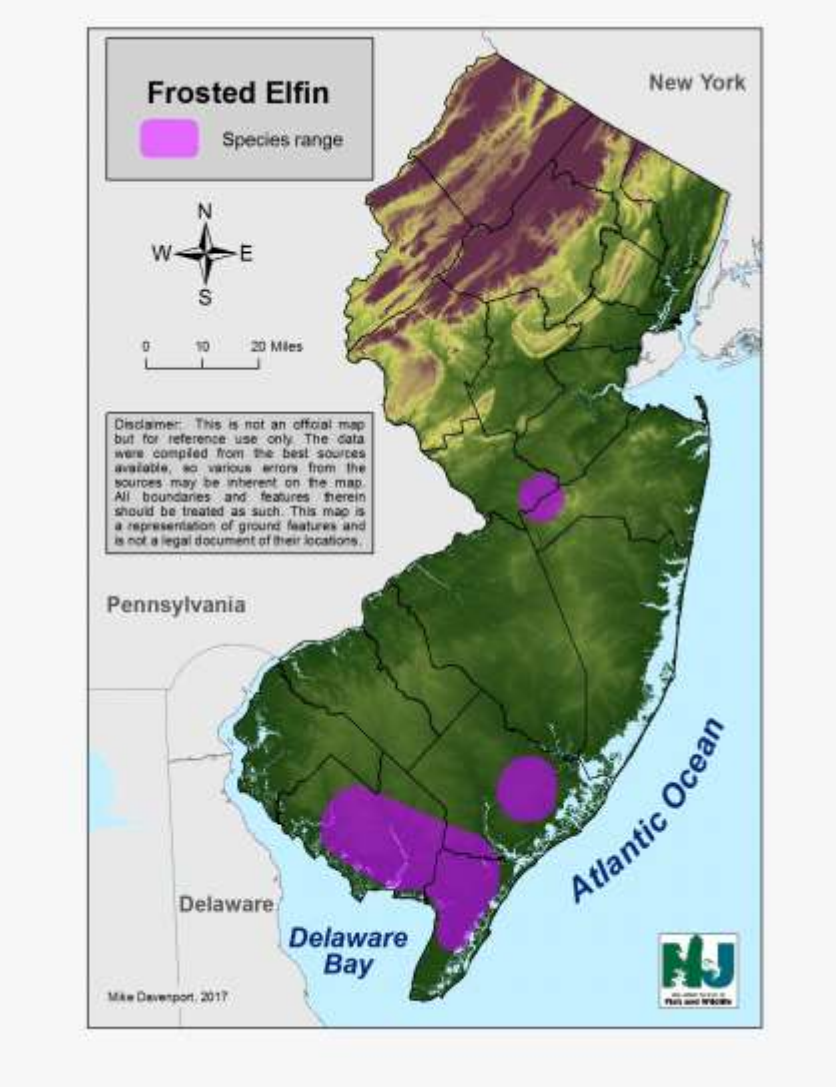
Abundance: Rare

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Grassland	X
Shrub	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
		x	x	x	

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Schweitzer, D.F., M.C. Minnow, and D.L. Wagner. 2014. Rare, Declining, and Poorly Known Butterflies and Moths of Forests and Woodlands in the Eastern United States. USDA Forest Service. Morgantown, W.V.	☑	☑	☐
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☑	☐

Georgia Satyr

Neonympha helicta

The Helicta Satyr (also known as Georgia Satyr) is a satyr species that occurs within the New Jersey Pinelands Region. It is found in areas of pine lowland meadows, wet savannahs, and bogs. It uses a variety of Carex sedge and grasses as larval food plants. The populations found in New Jersey possibly represent a unique subspecies. This species is largely threatened by the alteration of the natural fire and disturbance regimes that it depends on for maintenance of its habitats.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Macroinvertebrates

Taxa Sub Group: Terrestrial Invertebrates

Species Group: Leptidoptera

Guild Group: Butterflies

Conservation Target: Georgia Satyr

Conservation Status

State: SC

S_Rank: S3

Federal:

G_Rank: G3G4

Population Status

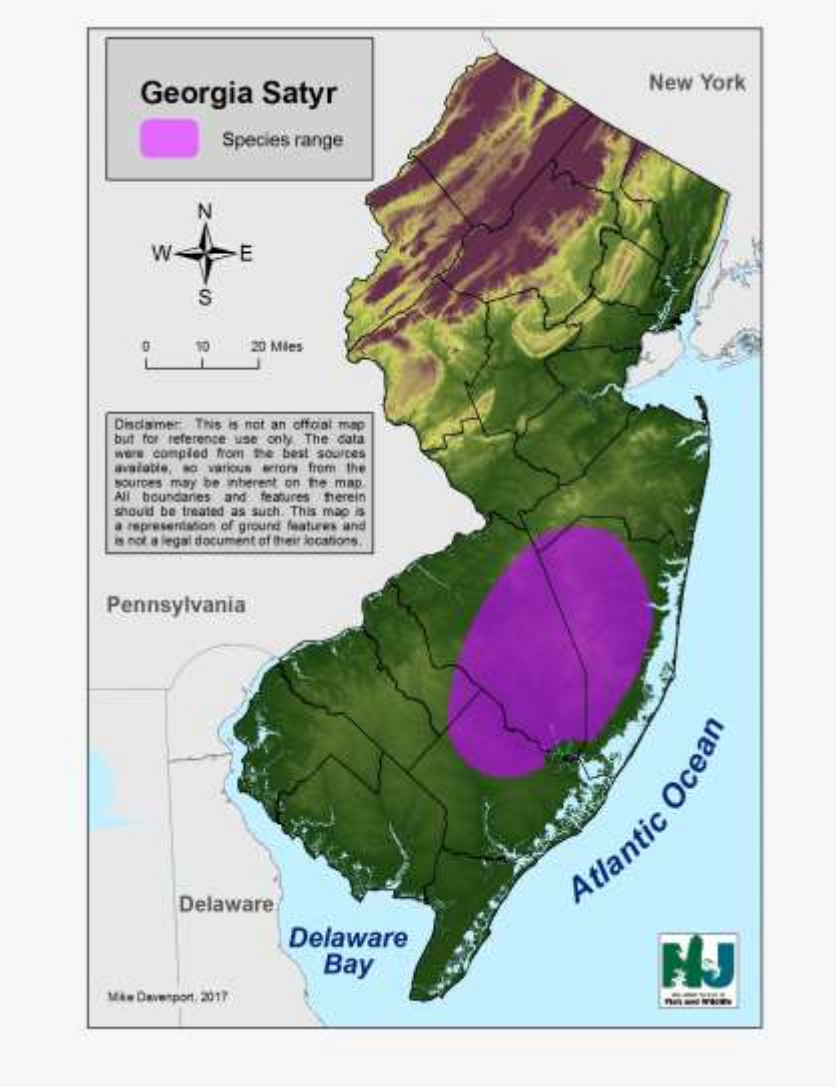
Abundance: Rare

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Shrub	X
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
				x	

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Schweitzer, D.F. 2011. Neonympha helicta. Natureserve-Explorer. Arlington, V.A. Available from http://explorer.natureserve.org/ (accessed January 2016).	☑	☑	☐
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☑	☐

Green Floater

Lasmigona subviridis

The Green Floater is a State Endangered freshwater mussel species. It is found in smaller streams, pools and eddies, preferring slow currents and gravelly or sandy substrates. There is some evidence that the species may not require a host fish in order to complete its life cycle. Green floaters once occurred in the Passaic, Raritan, Delaware and Pequest Rivers, but haven't been found alive in NJ since 1996, when a single individual was recorded in the Stony Brook. Regional population declines are tied to habitat destruction, water quality degradation, dam construction, and the invasion of exotic species.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Macroinvertebrates

Taxa Sub Group: Aquatic Invertebrates

Species Group: Mussels

Guild Group: Freshwater Mussels

Conservation Target: Freshwater Mussels

Conservation Status

State: E

S_Rank: S1

Federal:

G_Rank: G3

Population Status

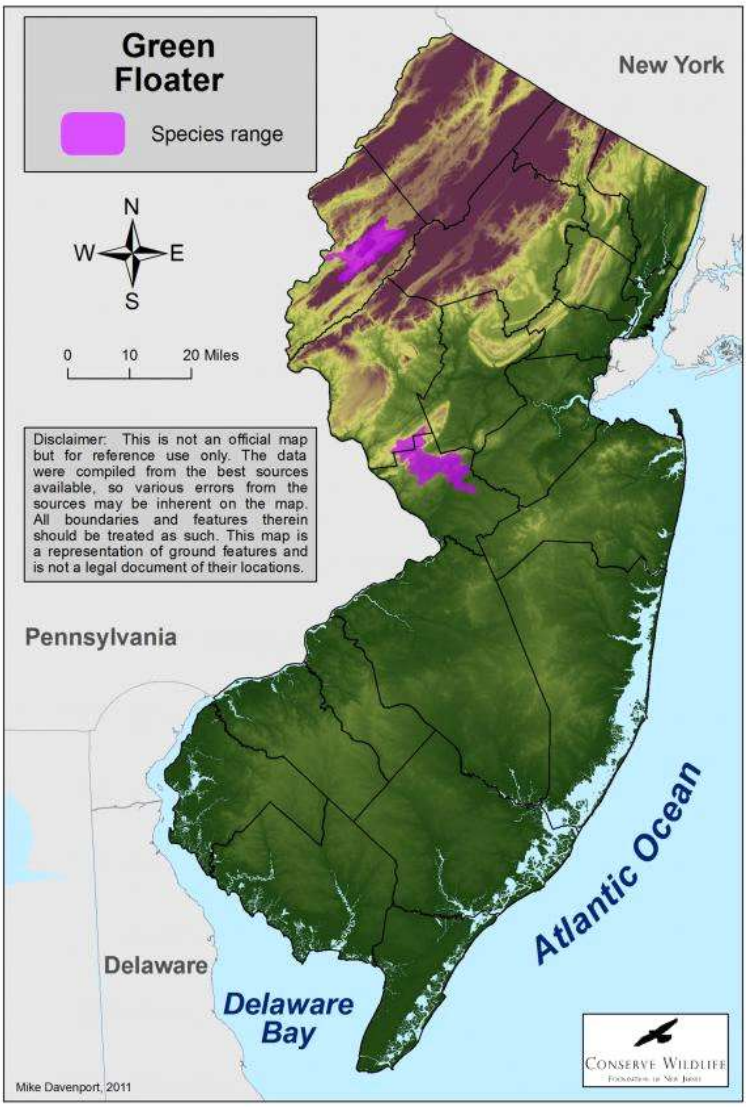
Abundance: Extremely Rare

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Coldwater Stream	X
Warmwater Stream	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
			x		x

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
National Mussel Conservation Committee. 1998. National strategy for the conservation of native freshwater mussels. Journal of Shellfish Research 17(5):1419-1428.	☐	☐	☑
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☑	☐
Davenport, M. 2012. Species Status Review of Freshwater Mussels. Results Report for the NJ Endangered and Nongame Species Advisory Committee. Conserve Wildlife Foundation of New Jersey. Trenton, N.J.	☑	☑	☐

Hoary Elfin

Callophrys polios

The Hoary Elfin is a species of hairstreak butterfly that is found within the Pinelands Region of New Jersey. It occurs in open areas of pitch pine-oak scrub and pine plains where its larval host plant, Bearberry (Arctostaphylos uva-ursi) occurs. This species is largely threatened by the alteration of the natural fire and disturbance regimes that it depends on for maintenance of its habitats.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Macroinvertebrates

Taxa Sub Group: Terrestrial Invertebrates

Species Group: Leptidoptera

Guild Group: Butterflies

Conservation Target: Hoary Elfin

Conservation Status

State: SC

S_Rank: S3

Federal:

G_Rank: G5

Population Status

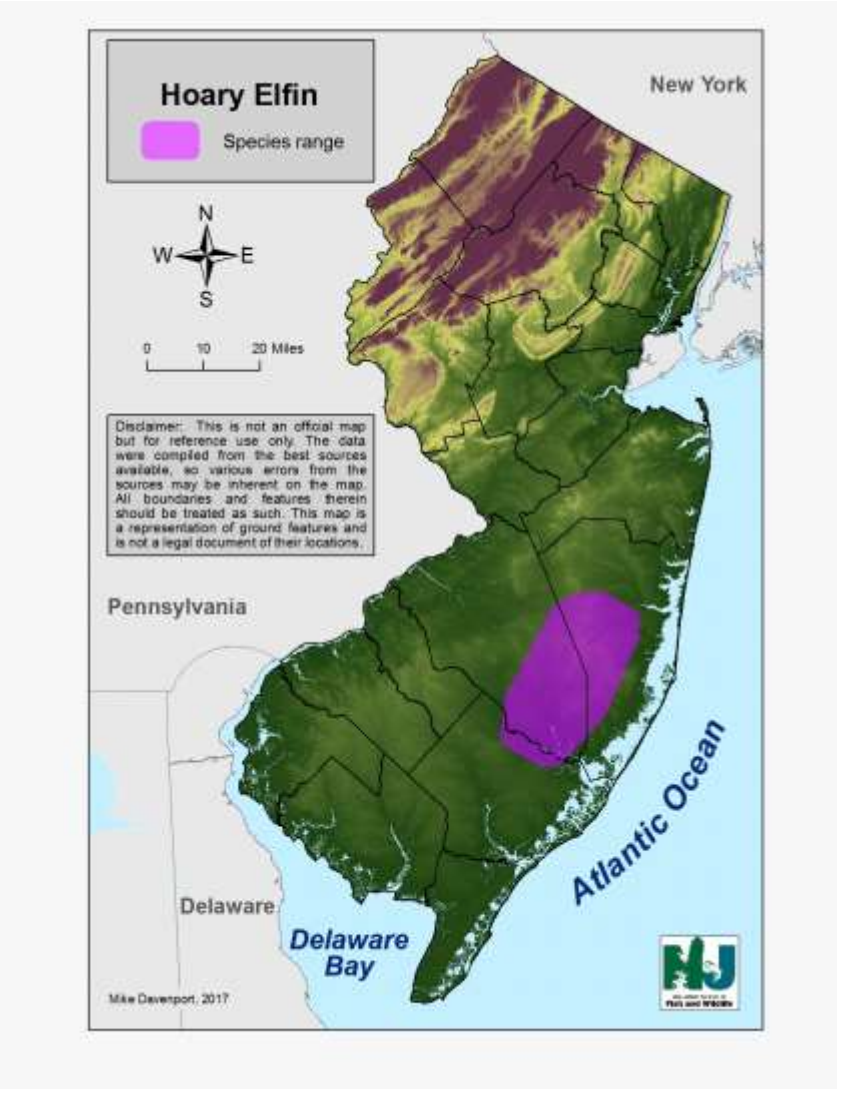
Abundance: Rare

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Grassland	X
Shrub	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
				x	

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☑	☐

Leonard's Skipper

Hesperia leonardus

Leonard's Skipper is a species of grass skipper found in scattered colonies throughout the state of New Jersey. Its larval host plant is Little Blue Stem (Schizachyrium scoparium) and it is found in a wide variety of open grassland and savannah habitats including often very small patches of open, grassy areas. In northern New Jersey, these areas are usually found on open ridge tops. This species is largely threatened by the alteration of the natural fire and disturbance regimes that it depends on for maintenance of its habitats.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Macroinvertebrates

Taxa Sub Group: Terrestrial Invertebrates

Species Group: Leptidoptera

Guild Group: Butterflies

Conservation Target: Leonard's Skipper

Conservation Status

State: SC

S_Rank: S3

Federal:

G_Rank: G4

Population Status

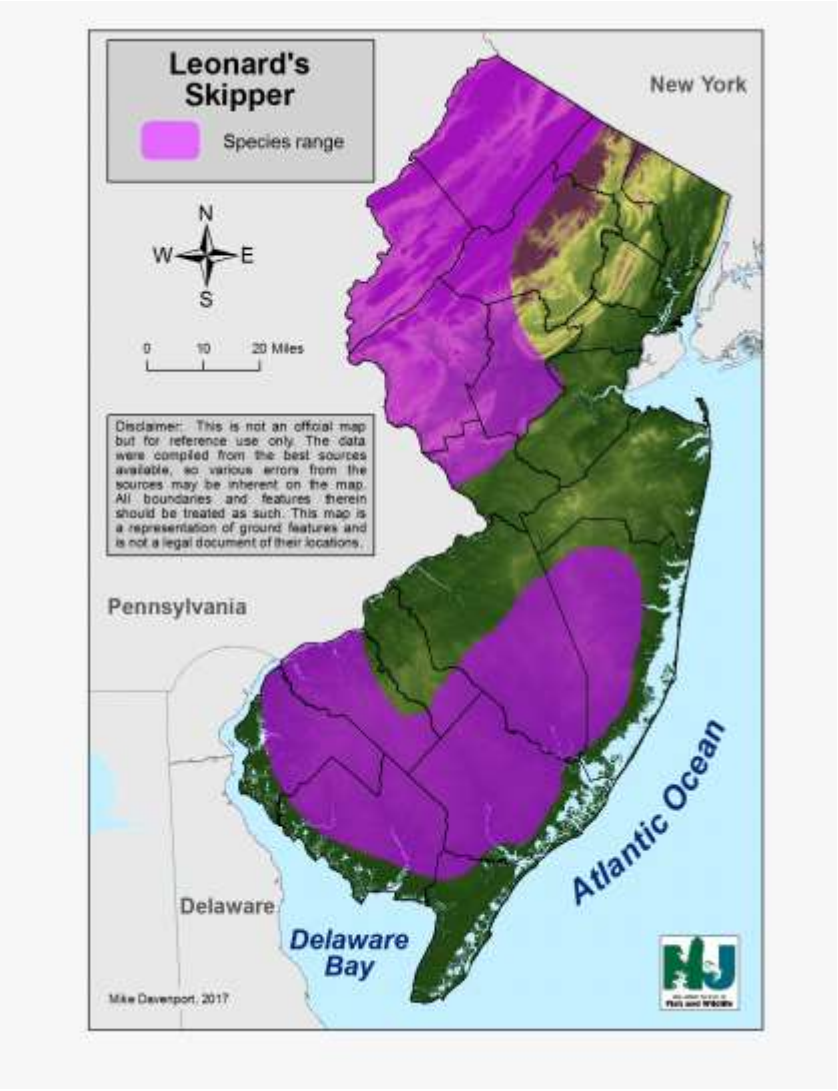
Abundance: Rare

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Grassland	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
		x	x	x	x

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Schweitzer, D.F., M.C. Minnow, and D.L. Wagner. 2014. Rare, Declining, and Poorly Known Butterflies and Moths of Forests and Woodlands in the Eastern United States. USDA Forest Service. Morgantown, W.V.	☑	☑	☐

Little White Tiger Beetle

Cicindela lepida

The Little White Tiger Beetle is a species of coastal beach tiger beetle that also occurs in the inland Pinelands Region of NJ. It occurs in undisturbed coastal beach habitats from the area of Little Egg Harbor Inlet south to the tip of Cape May. It is a beetle that feeds on a variety of other insects and invertebrates. Its larvae live in sand burrows that often occur in the dune and dune edge areas of beaches. The inland populations of this beetle occur in open, sandy areas of the New Jersey Pinelands and are often found along road edges and severely burned areas. It is threatened by human disturbance of beach areas and sandy areas in the Pinelands. It is also threatened by alteration of the natural fire regimes that help to maintain open, sandy, bare patches of habitat in the Pinelands.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Macroinvertebrates

Taxa Sub Group: Terrestrial Invertebrates

Species Group: Tiger Beetle

Guild Group: Beach Tiger Beetles

Conservation Target: Beach Tiger Beetles

Conservation Status

State:

S_Rank: S1S2

Federal:

G_Rank: G3G4

Population Status

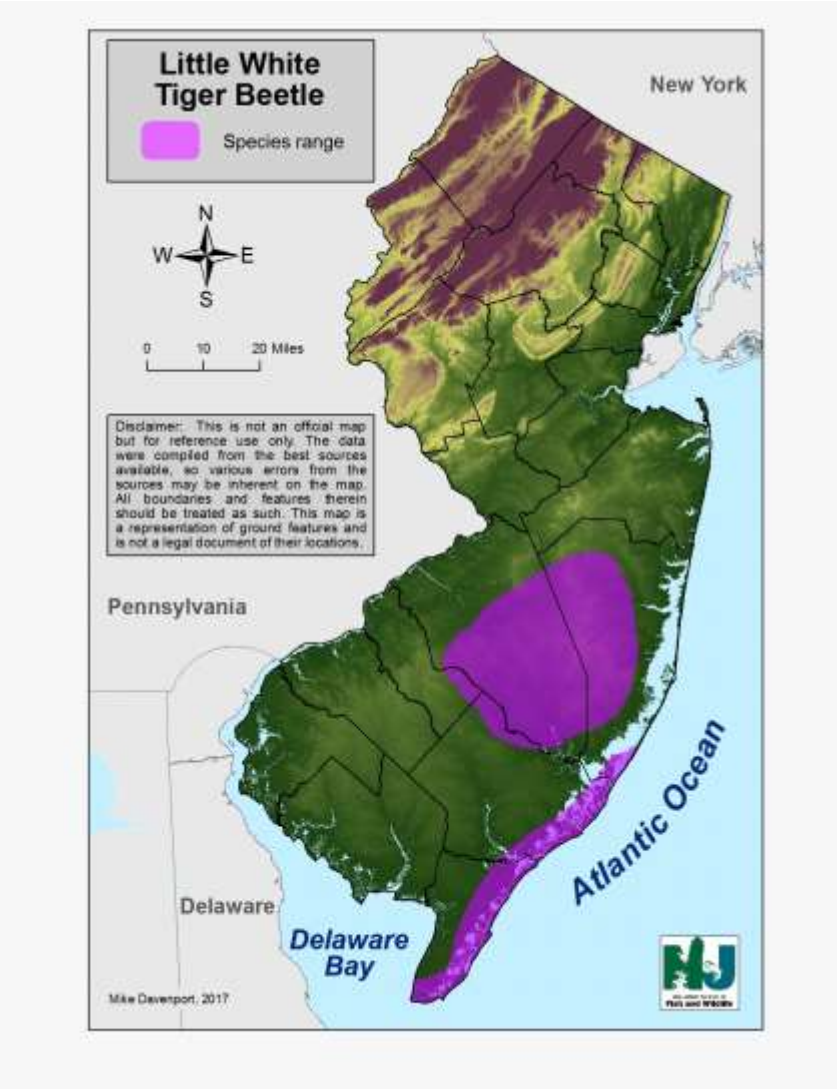
Abundance: Rare

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Beach and Dune	X
Forest	X
Grassland	X
Shrub	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
	x	x		x	

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Schweitzer, D.F. 2011. Cicindela lepida. Natureserve-Explorer. Arlington, V.A. Available from http://explorer.natureserve.org/ (accessed January 2016).	☑	☑	☐

Maritime Sunflower Borer Moth

Papaipema maritima

Maritime Sunflower Borer Moth is a species of papaipema moth that is found in southern New Jersey and occurs in a variety of grassland, meadow, and coastal marsh habitats. The larvae are a borer of Helianthus giganteus, the Giant Sunflower. This species is threatened by habitat loss or alteration due to human activity as well as the takeover of its habitat by the invasive Common Reed (Phragmites australis).

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Macroinvertebrates

Taxa Sub Group: Terrestrial Invertebrates

Species Group: Leptidoptera

Guild Group: Moths

Conservation Target: Maritime Sunflower Borer Moth

Conservation Status

State:

S_Rank: S1

Federal:

G_Rank: G3

Population Status

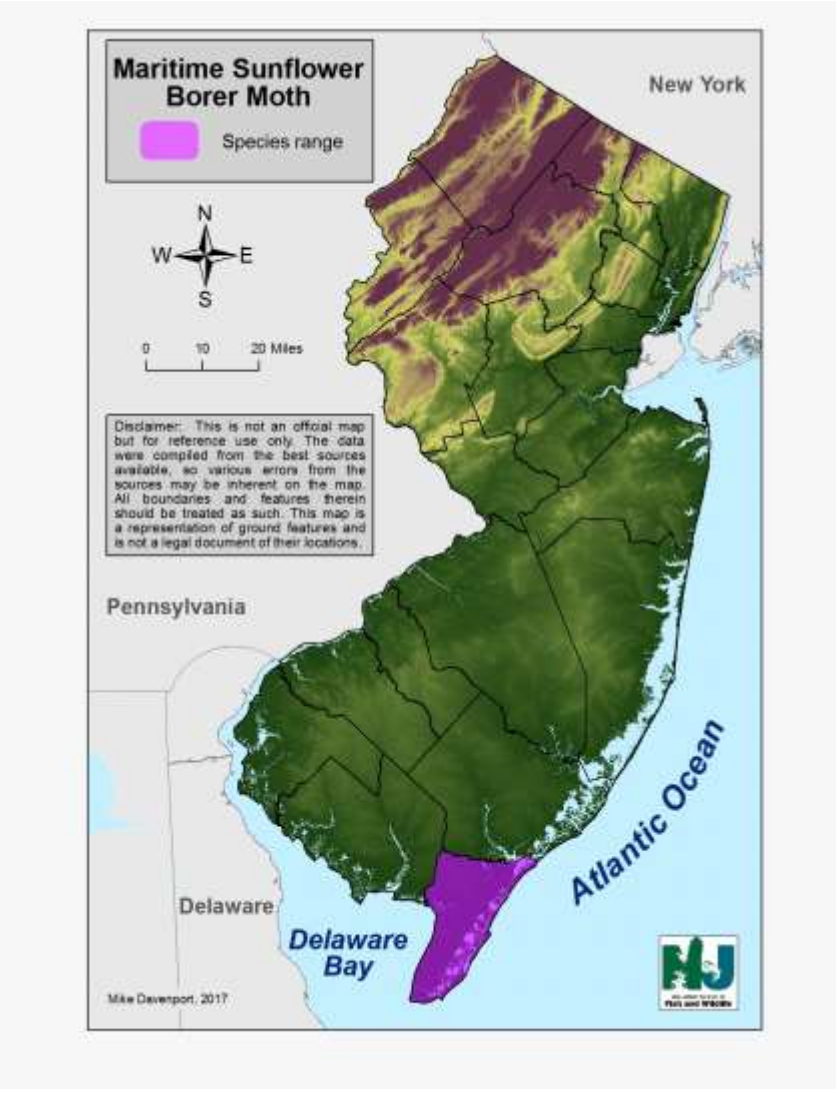
Abundance: Extremely Rare

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Beach and Dune	X
Grassland	X
Shrub	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
	x	x	x	x	

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Schweitzer, D.F., M.C. Minnow, and D.L. Wagner. 2014. Rare, Declining, and Poorly Known Butterflies and Moths of Forests and Woodlands in the Eastern United States. USDA Forest Service. Morgantown, W.V.	☑	☑	☐

New England Bluet

Enallagma laterale

The New England Bluet is a pond damselfly that occurs in ponds and lakes in scattered locations throughout northern New Jersey. The larvae depend on aquatic vegetation for shelter in these water-bodies, and the adults forage in the habitat adjacent to the water-body that they breed in. This species has a very restricted range in the northeastern United States.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Macroinvertebrates

Taxa Sub Group: Aquatic Invertebrates

Species Group: Odonata

Guild Group: Pond Odonates

Conservation Target: Pond Odonates

Conservation Status

State: SC

S_Rank: S3

Federal:

G_Rank: G3G4

Population Status

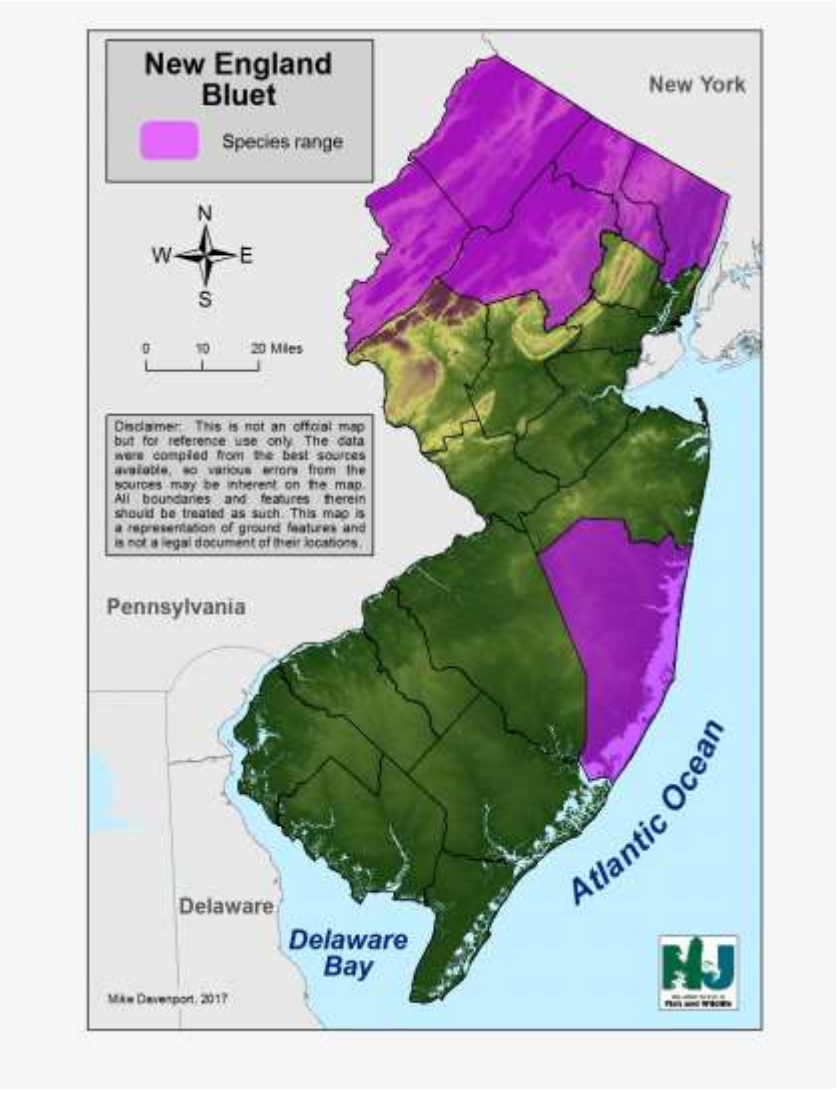
Abundance: Uncommon

Trend: Stable

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Warmwater Stream	X
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
					x

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☑	☐
White, E.L., P.D. Hunt, M.D. Schlesinger, J.D. Corser, and P.G. deMaynadier. 2014. A Conservation Status Assessment of Odonata for the Northeastern United States. New York Natural Heritage Program, Albany, N.Y.	☑	☑	☐

New Jersey Pine Barrens Tiger Beetle

Cicindela patruela consentanea

The New Jersey Pine Barrens Tiger Beetle is a unique subspecies of tiger beetle that occurs within the Pinelands Region of southern New Jersey. It occurs in a variety of pinelands habitats but is dependent on open sandy areas for breeding and for its larvae to burrow in to. It is threatened by alteration of the natural fire regimes that help to maintain open, sandy, bare patches of habitat in the Pinelands Region.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Macroinvertebrates

Taxa Sub Group: Terrestrial Invertebrates

Species Group: Tiger Beetle

Guild Group:

Conservation Target: New Jersey Pine Barrens Tiger Beetle

Conservation Status

State:

S_Rank: S2S3

Federal:

G_Rank: G3T1T3

Population Status

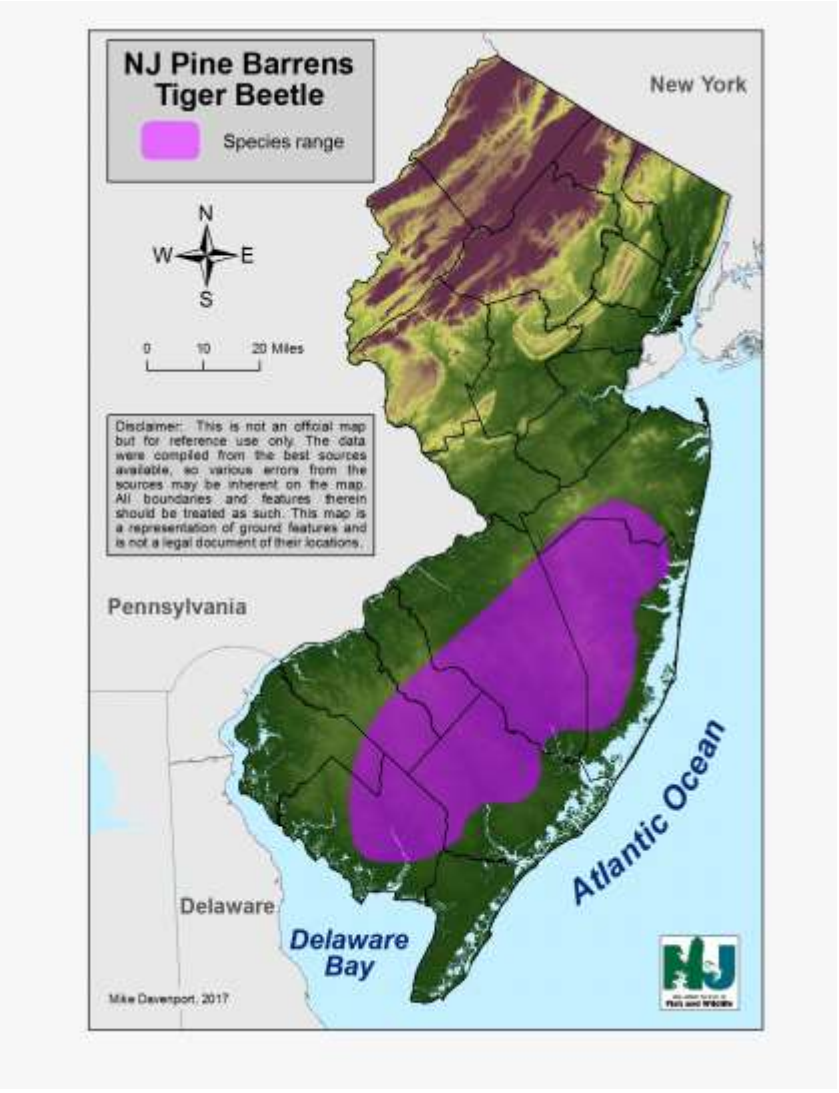
Abundance: Uncommon

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Forest	X
Grassland	X
Shrub	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
				x	

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☑	☐
Mawdsley, J.R. 2007. Ecology, Distribution, and Conservation Biology of the Tiger Beetle Cicindela patruela consentanea Dejean (Coleoptera: Carabidae: Cicindelinae). Proceedings of the Entomological Society of Washington 109: 17-28.	☑	☑	☐

Northeastern Beach Tiger Beetle

Cicindela dorsalis dorsalis

The Northeastern Beach Tiger Beetle is a species of coastal beach tiger beetle that was historically found from the area of Little Egg Harbor Inlet north to Sandy Hook. It was largely extirpated due to habitat loss and alteration and human disturbance of beach habitats and is now restricted to the area of Sandy Hook. It is a predatory beetle that feeds on a variety of other insects and invertebrates. Its larvae live in sand burrows between the high tide line and the dunes. The larvae are adapted to relocate their burrows inland/up beach during the winter months. It is closely related to the Southeastern Beach Tiger Beetle.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Macroinvertebrates

Taxa Sub Group: Terrestrial Invertebrates

Species Group: Tiger Beetle

Guild Group: Beach Tiger Beetles

Conservation Target: Beach Tiger Beetles

Conservation Status

State: E

S_Rank: S1

Federal:

G_Rank: G4T2

Population Status

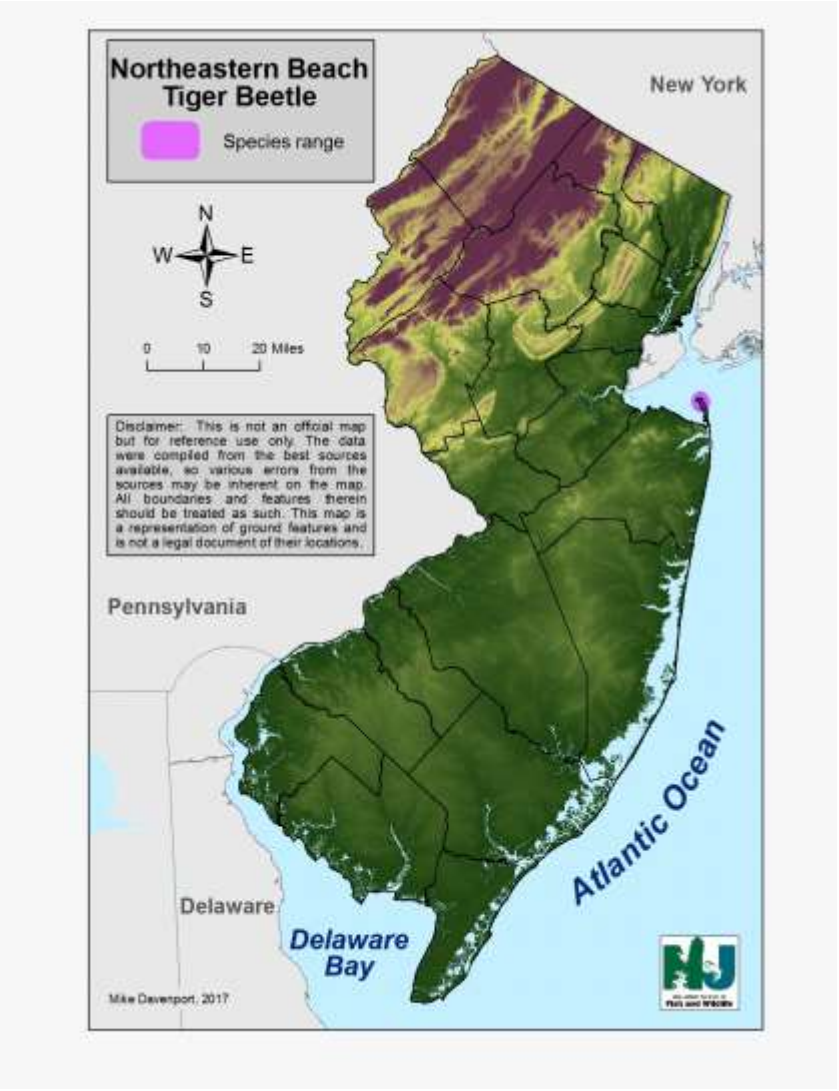
Abundance: Extremely Rare

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Beach and Dune	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
	x	x			

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
U.S. Fish and Wildlife Service. 1994. Northeastern Beach Tiger Beetle (Cincindela dorsalis dorsalis Say) Recovery Plan. USFWS, Hadley, M.A. Available from https://www.nrc.gov/docs/ML0719/ML071970332.pdf	☐	☐	☑
U.S. Fish and Wildlife Service. 2009. Northeastern Beach Tiger Beetle (Cicindela dorsalis dorsalis) 5-Year Review: Summary and Evaluation. Virginia Field Office, Gloucester, V.A. Available from https://www.fws.gov/northeast/EcologicalServices/pdf/endangered/NE_tiger_beetle%205%20Year%20Review.pdf	☑	☑	☑
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☑	☐

Northern Metalmark

Calephelis borealis

The Northern Metalmark butterfly is restricted to the limestone region of northwestern NJ and currently only occurs in Warren and Sussex Counties. This species inhabits woodland openings and glades, primarily red cedar glades that contain its nectar plants and its larval foodplant, Roundleaf Ragwort (Pakera obovatus). Roundleaf Ragwort is often found in and near the edge of forest stands in this region. This species is highly dependent on a variety of nectar plants that occur in these forest openings. Many former colonies of this butterfly had ample areas of the host food plant, but those areas have succeeded to the point that all available nectar sources were shaded out by the mature forest stand. The greatest threats to this species include the lack of natural disturbance to maintain the forest openings and glades that this species depends upon and the large number of invasive plant species found within its habitat. Invasive plants outcompete and shade out the larval host plant and nectar sources leading to the extirpation of this species from several locations.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Macroinvertebrates

Taxa Sub Group: Terrestrial Invertebrates

Species Group: Leptidoptera

Guild Group: Butterflies

Conservation Target: Northern Metalmark

Conservation Status

State: SC

S_Rank: S3

Federal:

G_Rank: G3G4

Population Status

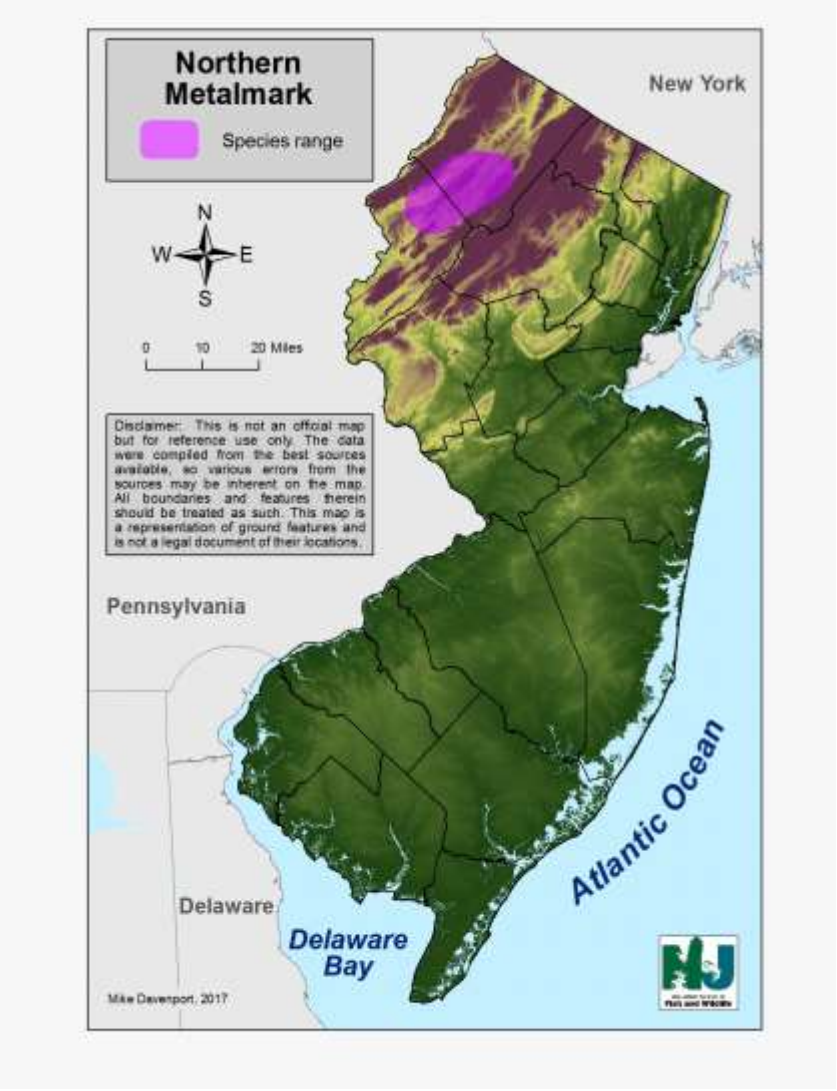
Abundance: Extremely Rare

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Forest	X
Grassland	X
Shrub	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
					x

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Schweitzer, D.F., M.C. Minnow, and D.L. Wagner. 2014. Rare, Declining, and Poorly Known Butterflies and Moths of Forests and Woodlands in the Eastern United States. USDA Forest Service. Morgantown, W.V.	☑	☑	☐
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☑	☐

Papaipema harrisii

Papaipema harrisii

Papaipema harrisii occurs in wetland and riparian habitats in northern New Jersey. Its larvae bore in to the stems of several species of Angelica and Heracleum. It is part of a broader group of moths loosely termed as forest forb feeding moths who have suffered extensive declines primarily due to deer herbivory of their host plants and due to invasive plant species taking over areas containing their food plants.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Macroinvertebrates

Taxa Sub Group: Terrestrial Invertebrates

Species Group: Leptidoptera

Guild Group: Moths

Conservation Target: Papaipema harrisii

Conservation Status

State:

S_Rank:

Federal:

G_Rank:

Population Status

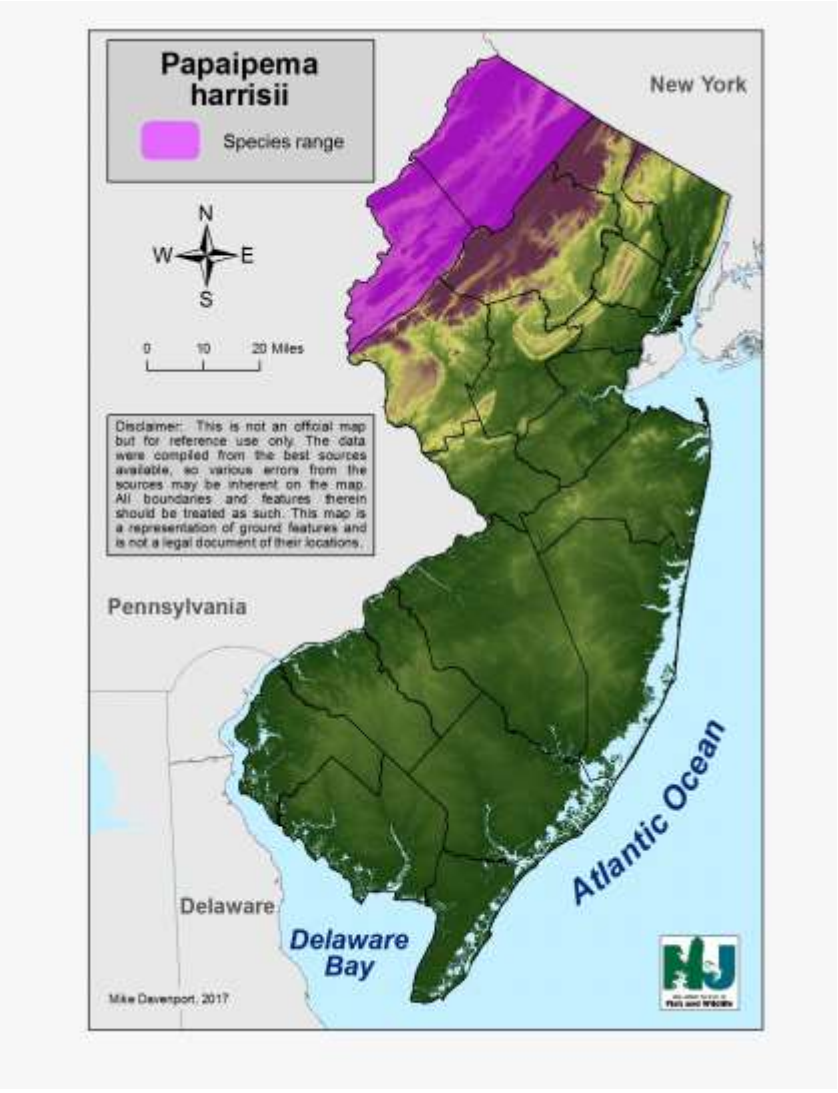
Abundance: Extremely Rare

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Forest	X
Grassland	X
Shrub	X
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
					x

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Schweitzer, D.F. 2011. Papaipema harrisii. Natureserve-Explorer. Arlington, V.A. Available from http://explorer.natureserve.org/ (accessed January 2016).	☑	☑	☐

Pine Barrens Bluet

Enallagma recurvatum

The Pine Barrens Bluet is a species of damselfly that occurs in ponds and lakes in the New Jersey Pinelands Region. The larvae are found in aquatic vegetation in and along the edges of these water-bodies, and the adults forage in the habitat adjacent to the water-body that they breed in. This species has a very restricted range in the northeastern United States.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Macroinvertebrates

Taxa Sub Group: Aquatic Invertebrates

Species Group: Odonata

Guild Group: Pond Odonates

Conservation Target: Pond Odonates

Conservation Status

State: SC

S_Rank: S3

Federal:

G_Rank: G3

Population Status

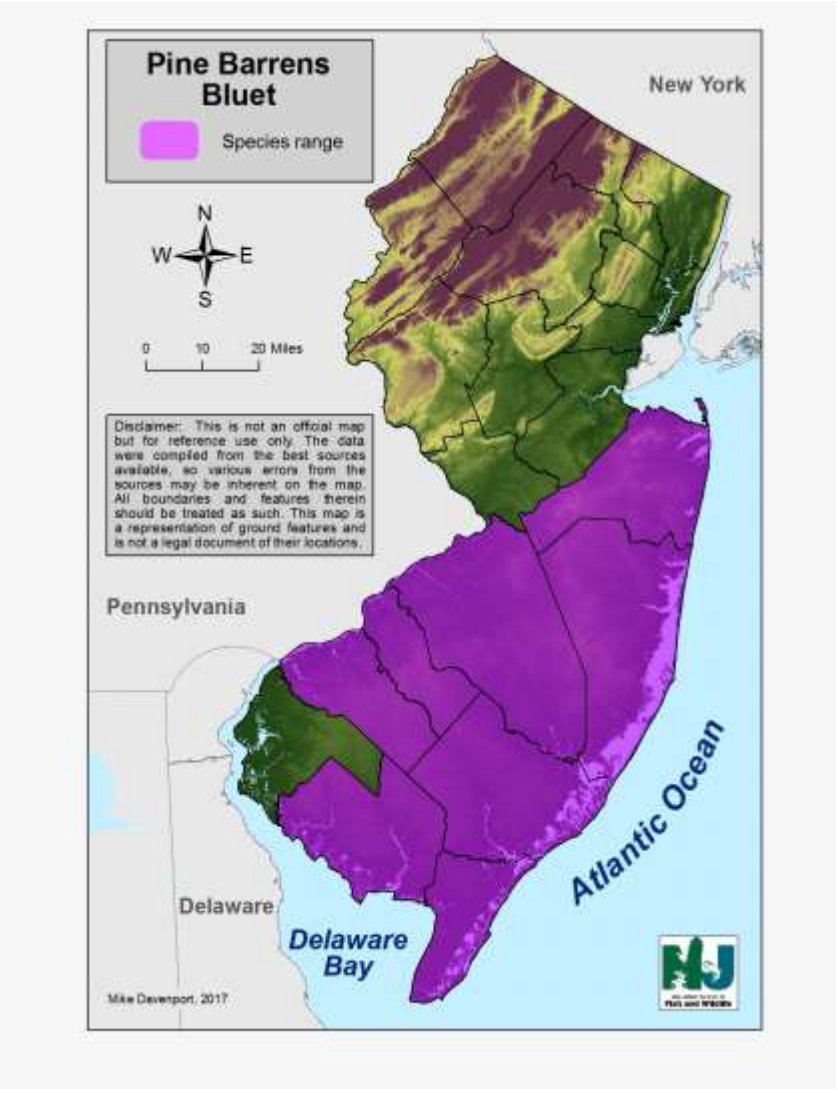
Abundance: Uncommon

Trend: Stable

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Warmwater Stream	X
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
		x		x	

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
White, E.L., P.D. Hunt, M.D. Schlesinger, J.D. Corser, and P.G. deMaynadier. 2014. A Conservation Status Assessment of Odonata for the Northeastern United States. New York Natural Heritage Program, Albany, N.Y.	☑	☑	☐
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☑	☐

Pink Sallow

Psectraglaea carnosa

The Pink Sallow is a species of noctuid moth that occurs in sandy pine and oak barrens in the New Jersey Pinelands Region. The larvae will feed on a variety of oaks, blueberries, and chokeberries found in these habitats. This species is largely threatened by the alteration of the natural fire and disturbance regimes that it depends on for maintenance of its habitats.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Macroinvertebrates

Taxa Sub Group: Terrestrial Invertebrates

Species Group: Leptidoptera

Guild Group: Moths

Conservation Target: Pinelands Moths

Conservation Status

State:

S_Rank: S3S4

Federal:

G_Rank: G3

Population Status

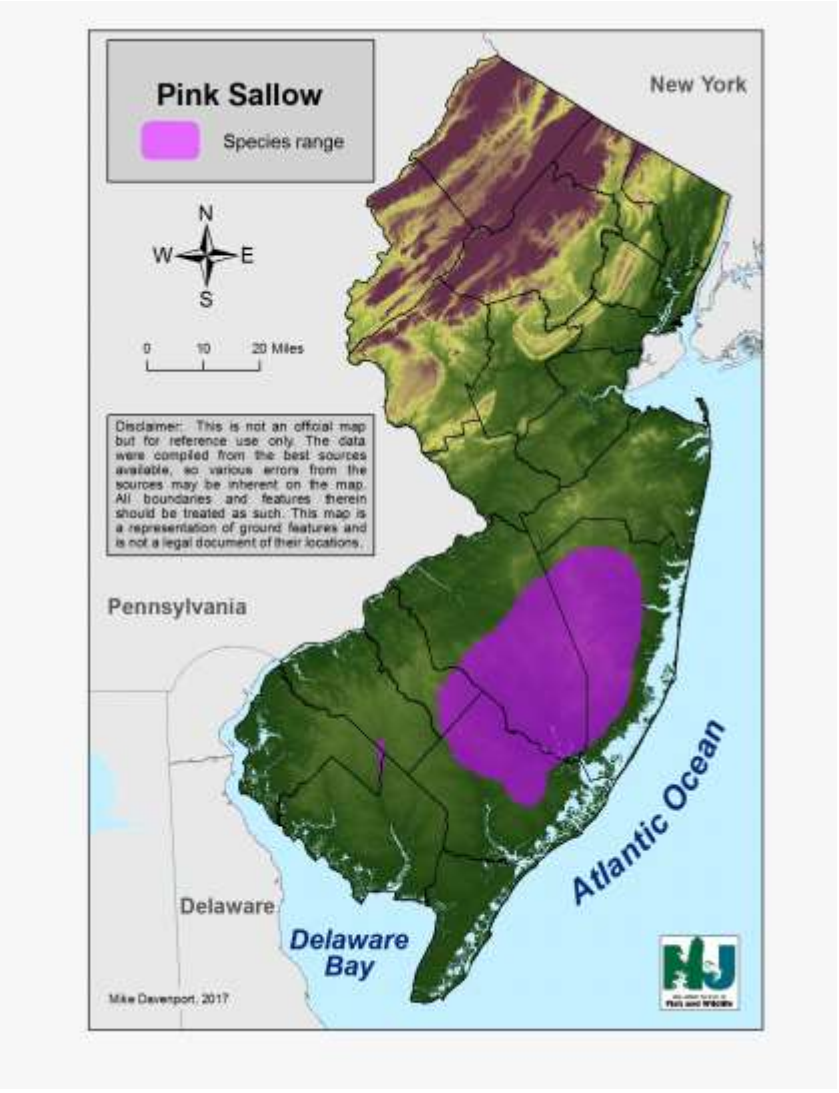
Abundance: Uncommon

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Forest	X
Shrub	X
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
		x	x	x	

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Schweitzer, D.F., M.C. Minnow, and D.L. Wagner. 2014. Rare, Declining, and Poorly Known Butterflies and Moths of Forests and Woodlands in the Eastern United States. USDA Forest Service. Morgantown, W.V.	☑	☑	☐

Robust Baskettail

Epitheca spinosa

The Robust Baskettail is found in scattered locations in southern New Jersey. The species occurs in swampy ponds and lakes and along slow rivers. Its larvae inhabit submerged aquatic vegetation in these water-bodies. The adults will often forage in fields and other open areas adjacent to these aquatic habitats. Alterations of water quality is the greatest threat to this species.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Macroinvertebrates

Taxa Sub Group: Aquatic Invertebrates

Species Group: Odonata

Guild Group:

Conservation Target: Robust Baskettail

Conservation Status

State: T

S_Rank: S2

Federal:

G_Rank: G4

Population Status

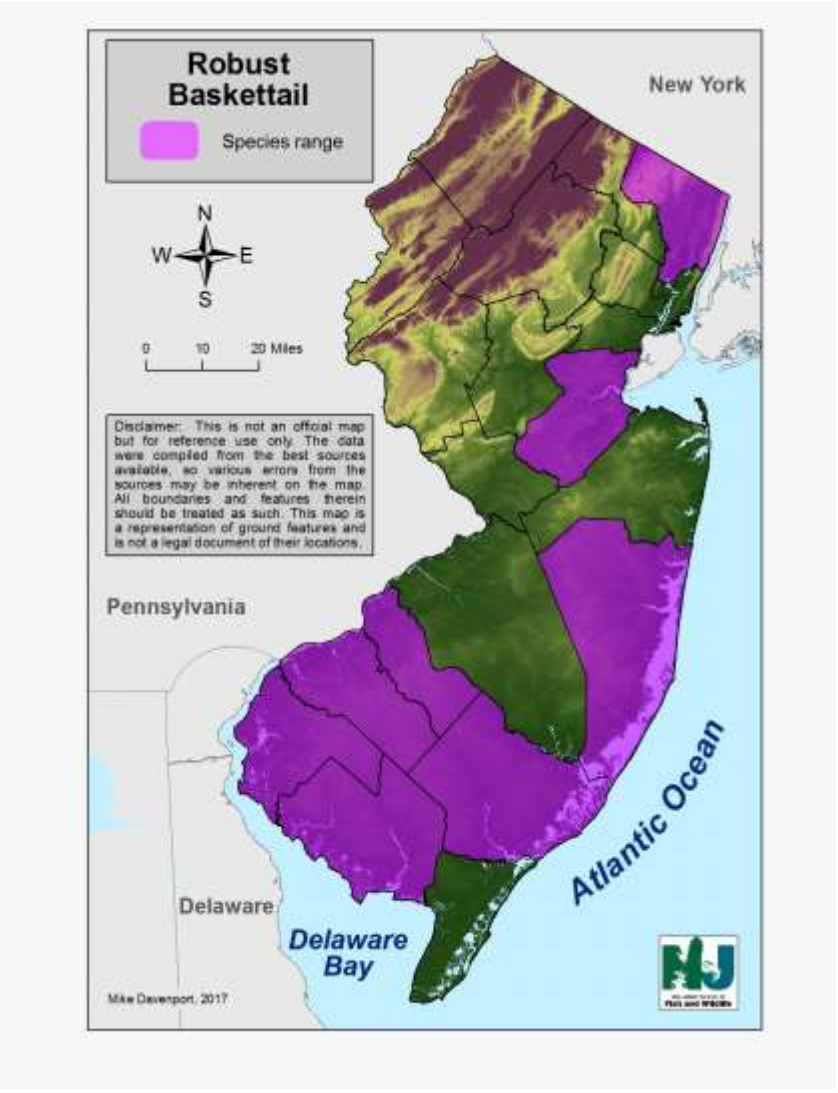
Abundance: Rare

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Coldwater Stream	X
Forest	X
Grassland	X
Shrub	X
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
		x	x	x	

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☑	☐

Rusty Patched Bumble Bee

Bombus affinis

The Rusty Patched Bumble Bee is an eastern species of bumble bee that occurs in and adjacent to woodlands. It nests underground in old borrows or holes and nectars on a wide variety of flowers. Historically it was found throughout the state of NJ but has suffered extensive declines over the last 20 years.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Macroinvertebrates

Taxa Sub Group: Terrestrial Invertebrates

Species Group:

Guild Group: Bumble Bees

Conservation Target: Bumble Bees

Conservation Status

State:

S_Rank:

Federal:

G_Rank:

Population Status

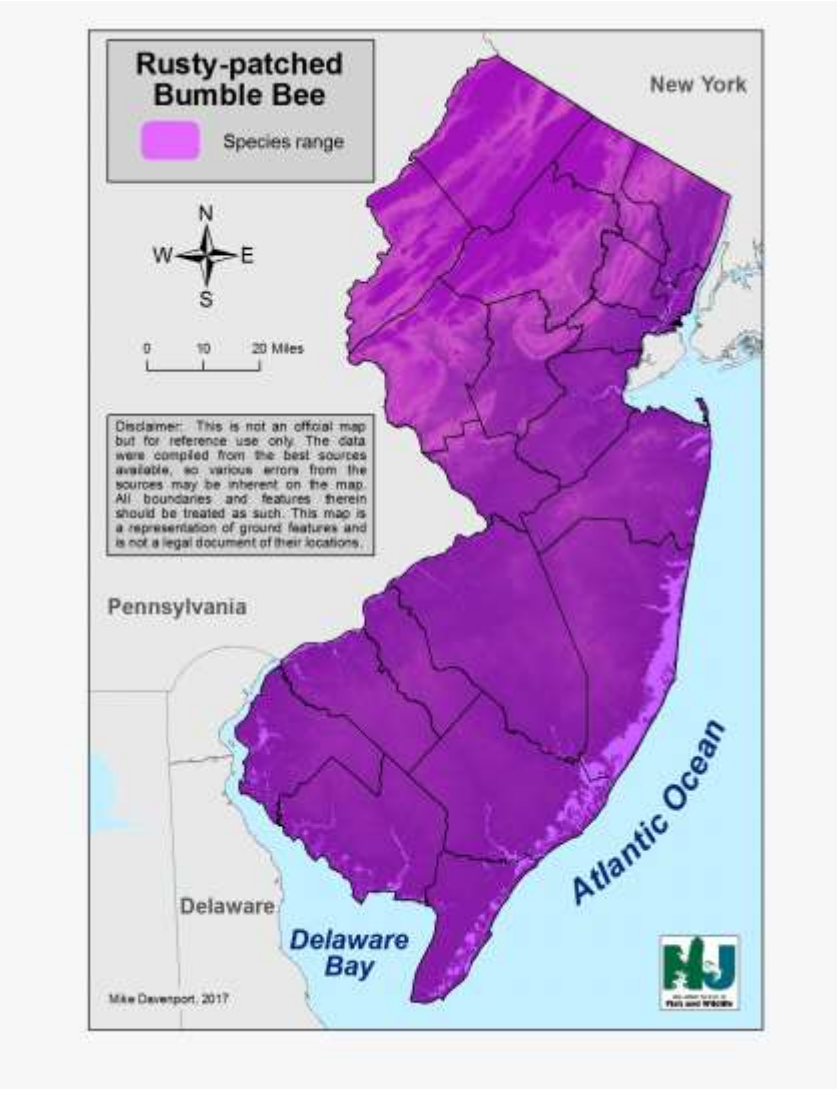
Abundance: Extremely Rare

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Forest	X
Grassland	X
Shrub	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
		x	x	x	x

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Williams, P., R. Thorp, L. Richardson, and S. Colla. 2014. An Identification Guide: Bumble Bees of North America. Princeton University Press. Princeton, N.J.	☑	☑	☐
Schweitzer, D.F., N.A. Capuano, B.E. Young, and S.R. Colla. 2012. Conservation and management of North American bumble bees. NatureServe, Arlington, Virginia, and USDA Forest Service, Washington, D.C. Available from https://www.fs.fed.us/wildflowers/pollinators/documents/ConsMgmtNABumbleBees.pdf	☐	☐	☑

Sand Myrtle Looper/Pink

Cyclophora culicaria

The Sand Myrtle Pink is a species of noctuid moth found in the New Jersey Pinelands Region that has not been formally described. Its larval host plant is Sand Myrtle (Leiphyllum buxifolium). This species is largely threatened by the alteration of the natural fire and disturbance regimes that it depends on for maintenance of its habitats.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Macroinvertebrates

Taxa Sub Group: Terrestrial Invertebrates

Species Group: Leptidoptera

Guild Group: Moths

Conservation Target: Pinelands Moths

Conservation Status

State:

S_Rank: SNR

Federal:

G_Rank: G3

Population Status

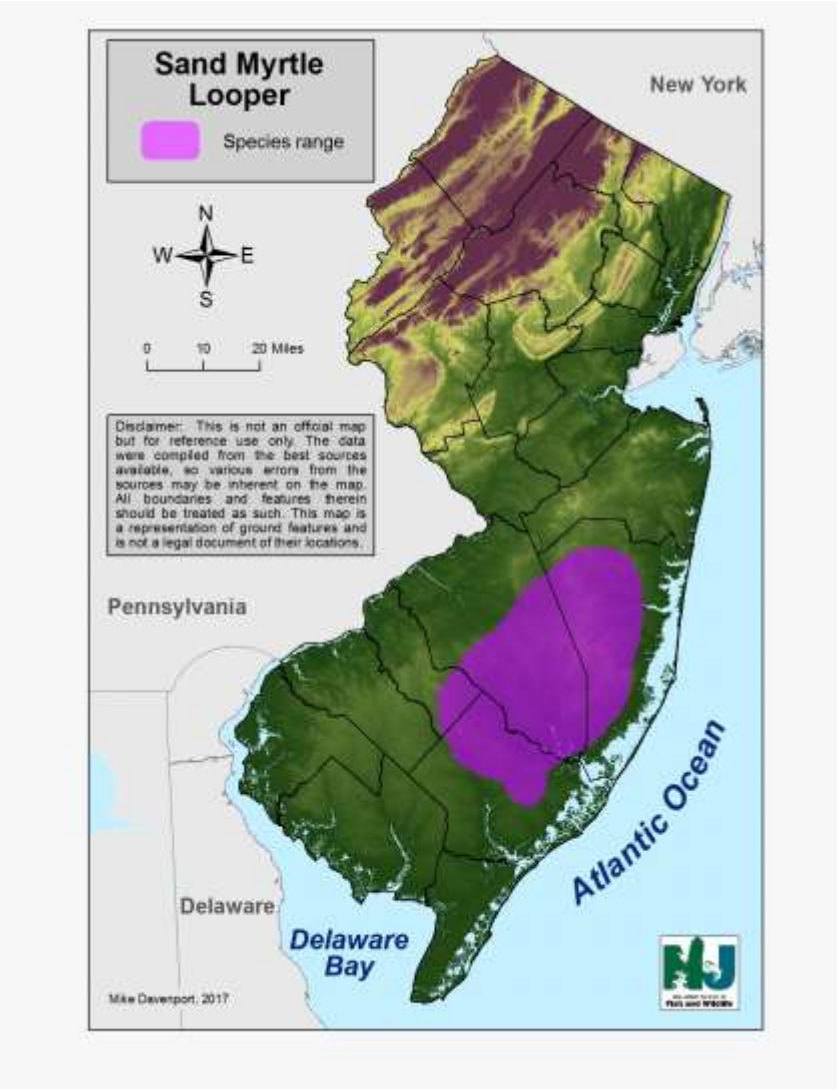
Abundance: Rare

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Forest	X
Grassland	X
Shrub	X
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
				x	

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Schweitzer, D.F., M.C. Minnow, and D.L. Wagner. 2014. Rare, Declining, and Poorly Known Butterflies and Moths of Forests and Woodlands in the Eastern United States. USDA Forest Service. Morgantown, W.V.	☑	☑	☐

Scarlet Bluet

Enallagma pictum

The Scarlet Bluet damselfly occurs in the New Jersey Pinelands Region and is found in sandy bottomed ponds and lakes. This species has a highly restricted range in the northeastern United States, and New Jersey is its stronghold. Its larvae live in aquatic vegetation found in these water-bodies, and the adults will forage in the surrounding terrestrial habitat.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Macroinvertebrates

Taxa Sub Group: Aquatic Invertebrates

Species Group: Odonata

Guild Group: Pond Odonates

Conservation Target: Pond Odonates

Conservation Status

State: SC

S_Rank: S3

Federal:

G_Rank: G3

Population Status

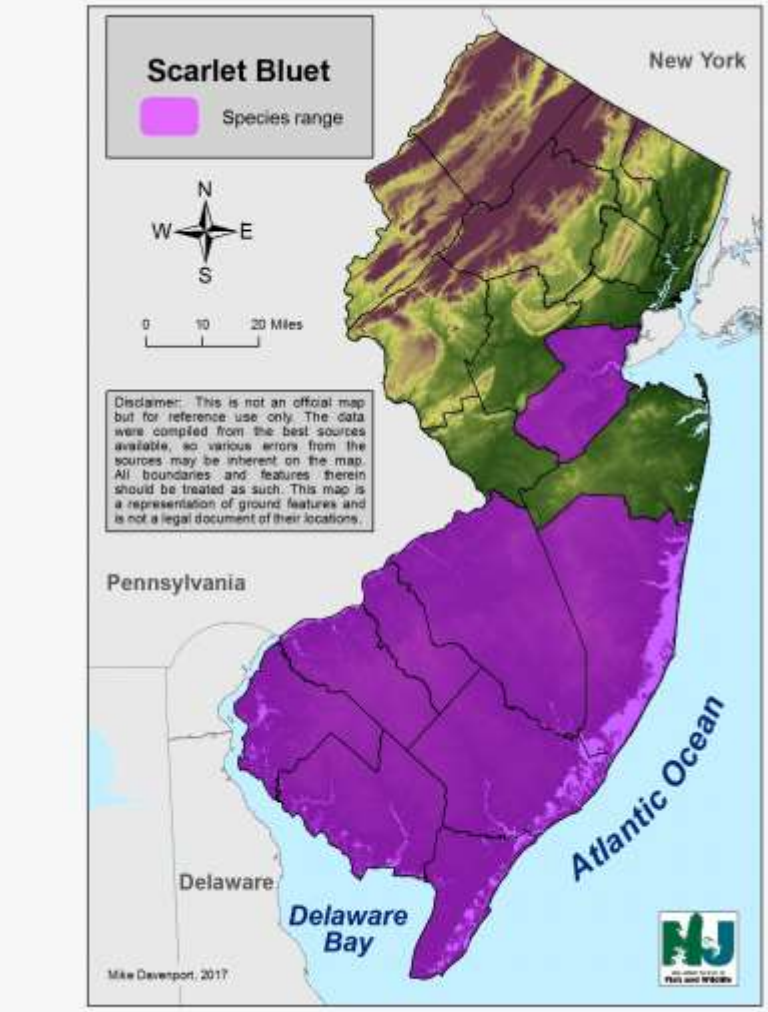
Abundance: Uncommon

Trend: Stable

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
				x	

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
White, E.L., P.D. Hunt, M.D. Schlesinger, J.D. Corser, and P.G. deMaynadier. 2014. A Conservation Status Assessment of Odonata for the Northeastern United States. New York Natural Heritage Program, Albany, N.Y.	☑	☑	☐
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☑	☐

Septima's Clubtail

Gomphus septima

Septima's Clubtail and more specifically, the subspecies G.s. delawarensis, is a unique subspecies that occurs only in the Delaware River watershed. This species occurs in medium to large rivers and its larvae burrow in sandy and silty areas of riverbed. The adults of this species forage in fields and forests adjacent to the river. Alterations to natural stream hydrology and water quality are the greatest threat to this species.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Macroinvertebrates

Taxa Sub Group: Aquatic Invertebrates

Species Group: Odonata

Guild Group:

Conservation Target: Septima's Clubtail

Conservation Status

State: SC

S_Rank: S3

Federal:

G_Rank: G2

Population Status

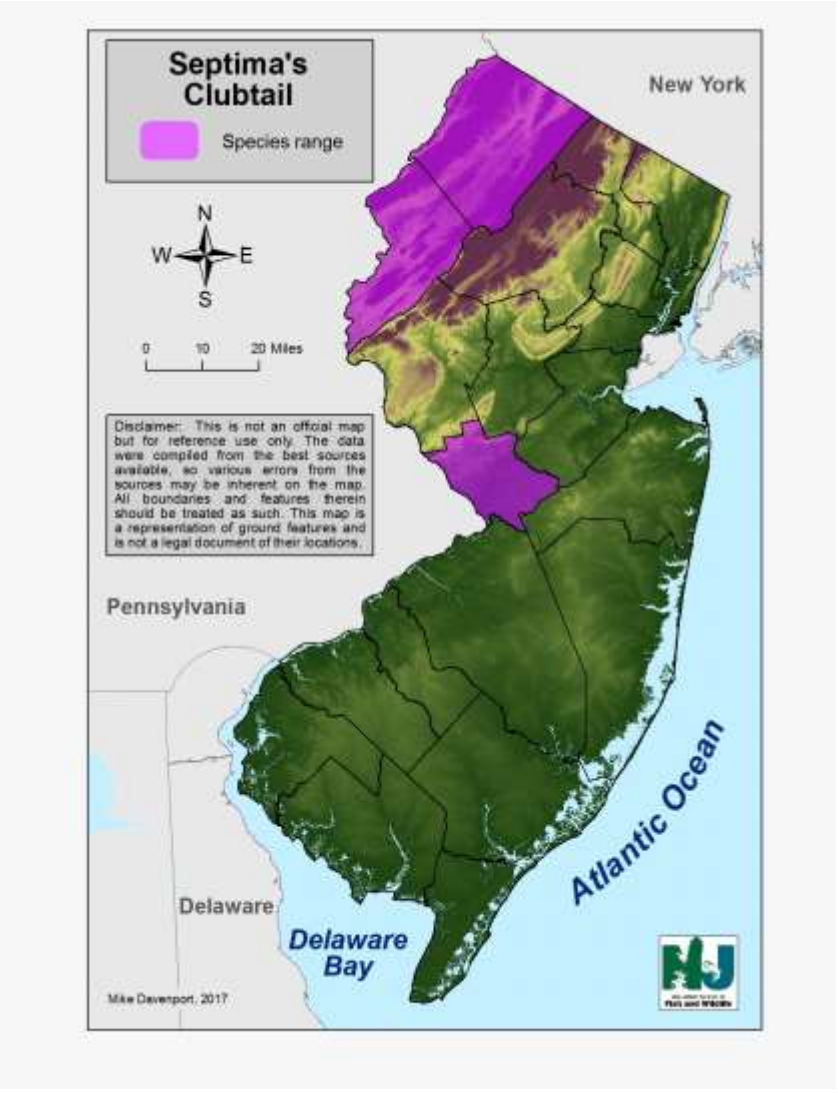
Abundance: Rare

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Coldwater Stream	X
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
					x

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
White, E.L., P.D. Hunt, M.D. Schlesinger, J.D. Corser, and P.G. deMaynadier. 2014. A Conservation Status Assessment of Odonata for the Northeastern United States. New York Natural Heritage Program, Albany, N.Y.	☑	☑	☐
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☑	☐

Southeastern Beach Tiger Beetle

Cicindela dorsalis media

The Southeastern Beach Tiger Beetle is a species of coastal beach tiger beetle that was historically found from the area of Little Egg Harbor inlet south to the tip of Cape May. It was largely extirpated due to habitat loss and alteration and human disturbance of beach habitats and is now restricted to the areas of Little Beach and Holgate around the Little Egg Harbor Inlet. It is a predatory beetle that feeds on a variety of other insects and invertebrates. Its larvae live in sand burrows between the high tide line and the dunes. The larvae are adapted to relocate their burrows inland/up beach during the winter months. It is closely related to the Northeastern Beach Tiger Beetle.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Macroinvertebrates

Taxa Sub Group: Terrestrial Invertebrates

Species Group: Tiger Beetle

Guild Group: Beach Tiger Beetles

Conservation Target: Beach Tiger Beetles

Conservation Status

State:

S_Rank: S1S2

Federal:

G_Rank: G4T3T4

Population Status

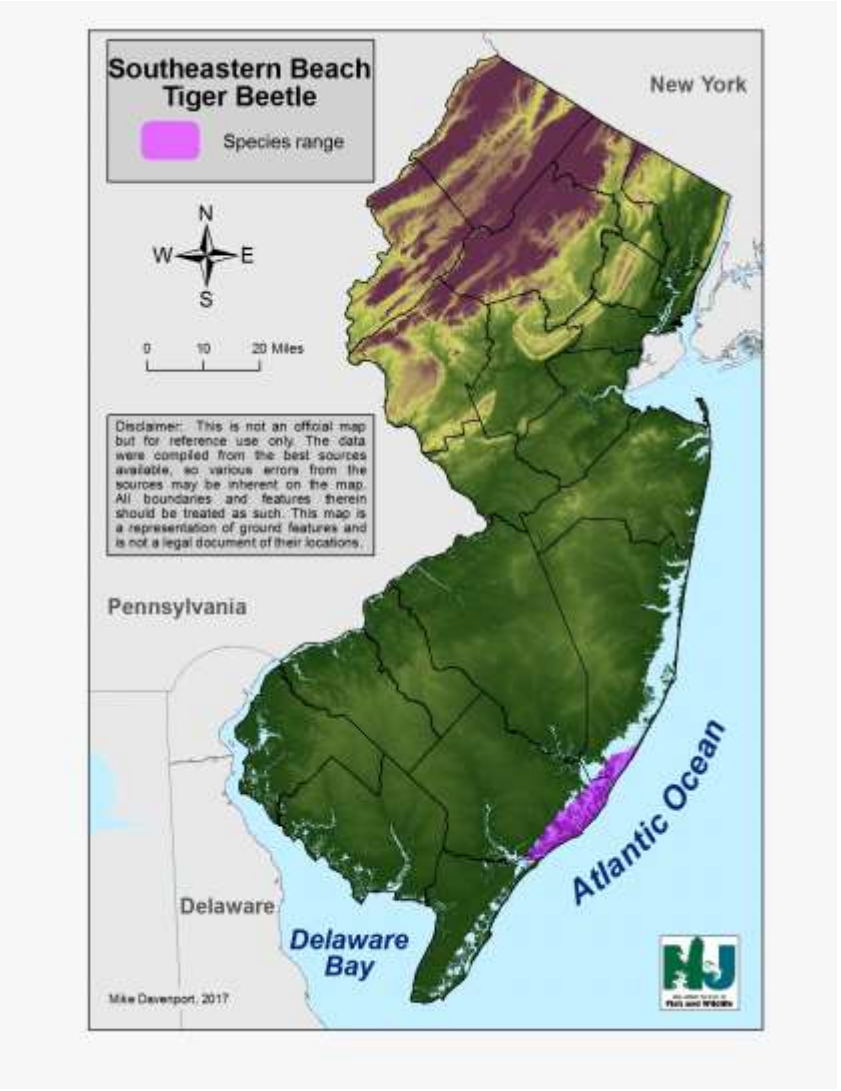
Abundance: Rare

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Beach and Dune	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
	x	x			

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Schweitzer, D.F. 2011. Cicindela dorsalis media. Natureserve-Explorer. Arlington, V.A. Available from http://explorer.natureserve.org/ (accessed January 2016).	☑	☑	☐
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☑	☐

Southern Plains Bumble Bee

Bombus fraternus

The Southern Plains Bumble Bee is a southeastern species of bumble bee found in a variety of grassland habitats and nests underground. It is found in Southern New Jersey and has been suffering a gradual decline throughout its range.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Macroinvertebrates

Taxa Sub Group: Terrestrial Invertebrates

Species Group:

Guild Group: Bumble Bees

Conservation Target: Bumble Bees

Conservation Status

State:

S_Rank:

Federal:

G_Rank:

Population Status

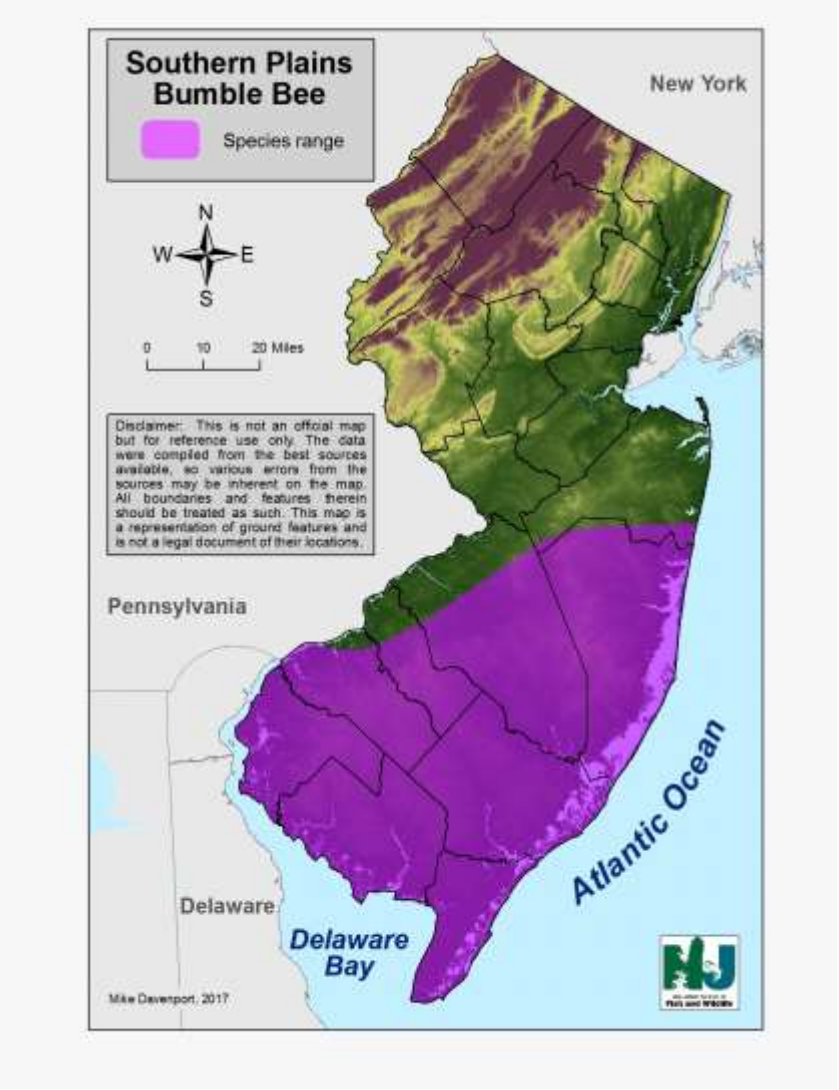
Abundance: Uncommon

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Forest	X
Grassland	X
Shrub	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
		x	x	x	x

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Williams, P., R. Thorp, L. Richardson, and S. Colla. 2014. An Identification Guide: Bumble Bees of North America. Princeton University Press. Princeton, N.J.	☑	☑	☐
Schweitzer, D.F., N.A. Capuano, B.E. Young, and S.R. Colla. 2012. Conservation and management of North American bumble bees. NatureServe, Arlington, Virginia, and USDA Forest Service, Washington, D.C. Available from https://www.fs.fed.us/wildflowers/pollinators/documents/ConsMgmtNABumbleBees.pdf	☐	☐	☑

Superb Jewelwing

Calopteryx amata

The Superb Jewelwing is restricted to the Flatbrook Watershed in Sussex County. This species inhabits small rivers and streams with large amounts of submerged aquatic vegetation where the larvae take cover and forage. Alterations to natural stream hydrology and water quality are the greatest threat to this species.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Macroinvertebrates

Taxa Sub Group: Aquatic Invertebrates

Species Group: Odonata

Guild Group:

Conservation Target: Superb Jewelwing

Conservation Status

State: T

S_Rank: S2

Federal:

G_Rank: G4

Population Status

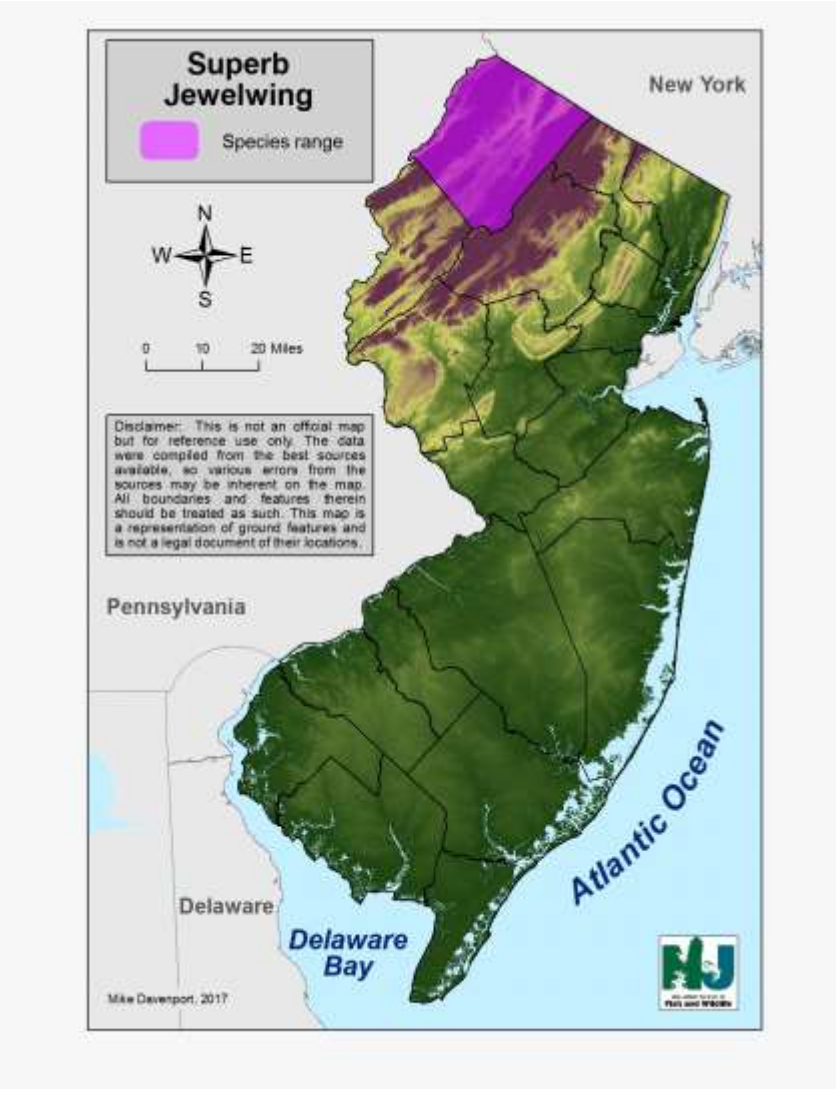
Abundance: Rare

Trend: Stable

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Coldwater Stream	X
Forest	X
Wetlands	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
					x

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
White, E.L., P.D. Hunt, M.D. Schlesinger, J.D. Corser, and P.G. deMaynadier. 2014. A Conservation Status Assessment of Odonata for the Northeastern United States. New York Natural Heritage Program, Albany, N.Y.	☑	☑	☐
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☑	☐

Triangle Floater

Alasmidonta undulata

The Triangle Floater is a State Threated freshwater mussel species that inhabits a variety of stream, river and lake habitats. It can be found from Salem County in the south to Sussex County in the north. Although widely distributed in NJ waterways, the species seldom occurs in large numbers. As with most freshwater mussels, the Triangle Floater requires particular host fish species to complete its life cycle. Triangle Floaters are threatened by habitat destruction, water quality degradation, dam construction and the invasion of aquatic species.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Macroinvertebrates

Taxa Sub Group: Aquatic Invertebrates

Species Group: Mussels

Guild Group: Freshwater Mussels

Conservation Target: Freshwater Mussels

Conservation Status

State: T

S_Rank: S2

Federal:

G_Rank: G4

Population Status

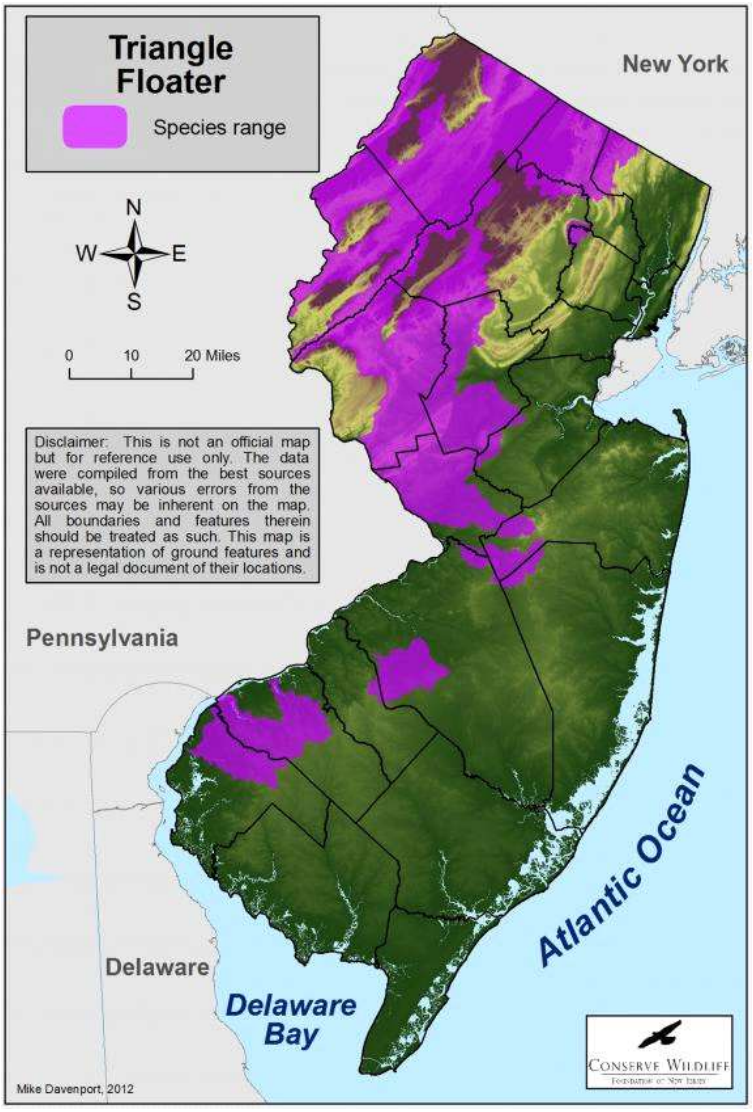
Abundance: Uncommon

Trend: Unknown

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Coldwater Stream	X
Warmwater Stream	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
		x	x	x	x

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Davenport, M. 2012. Species Status Review of Freshwater Mussels. Results Report for the NJ Endangered and Nongame Species Advisory Committee. Conserve Wildlife Foundation of New Jersey. Trenton, N.J.	☑	☑	☐
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☑	☐
National Mussel Conservation Committee. 1998. National strategy for the conservation of native freshwater mussels. Journal of Shellfish Research 17(5):1419-1428.	☐	☐	☑

Variable Cuckoo Bumble Bee

Bombus variabilis

The Variable Cuckoo Bumble Bee is an eastern species of cuckoo bee that occupies a variety of habitats. This species is a nest parasite of other bumble bee species and its decline parallels the decline of its host. It historically occurred in NJ but is now one of the rarest bumble bee species in North America.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Macroinvertebrates

Taxa Sub Group: Terrestrial Invertebrates

Species Group:

Guild Group: Bumble Bees

Conservation Target: Bumble Bees

Conservation Status

State:

S_Rank:

Federal:

G_Rank:

Population Status

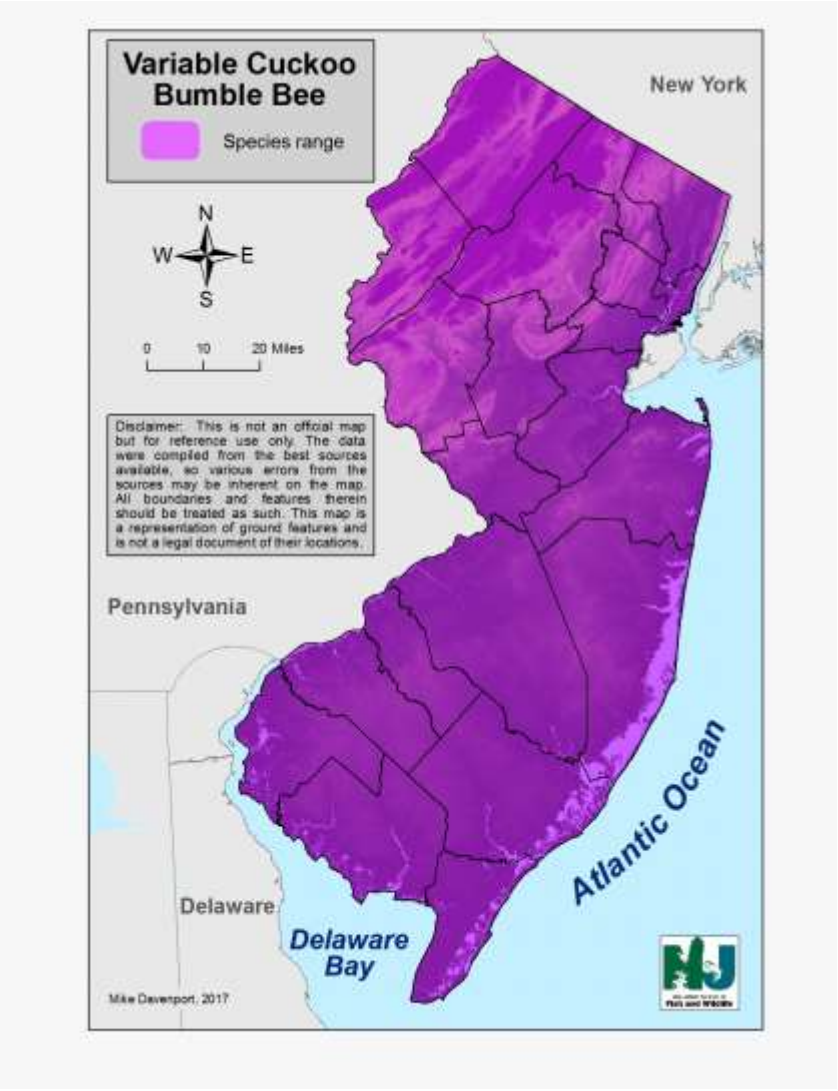
Abundance: Extremely Rare

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Forest	X
Grassland	X
Shrub	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
		x	x	x	x

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Schweitzer, D.F., N.A. Capuano, B.E. Young, and S.R. Colla. 2012. Conservation and management of North American bumble bees. NatureServe, Arlington, Virginia, and USDA Forest Service, Washington, D.C. Available from https://www.fs.fed.us/wildflowers/pollinators/documents/ConsMgmtNABumbleBees.pdf	☐	☐	☑
Williams, P., R. Thorp, L. Richardson, and S. Colla. 2014. An Identification Guide: Bumble Bees of North America. Princeton University Press. Princeton, N.J.	☑	☑	☐

Yellow Bumble Bee

Bombus fervidus

The Yellow Bumble Bee is a widespread species of bumble bee that occupies grassland and farmland habitats. It usually nests aboveground or on the ground surface in tall grass or inside of other structure such as grass piles and old mouse nests. It occurs throughout NJ but has been suffering a gradual decline.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Macroinvertebrates

Taxa Sub Group: Terrestrial Invertebrates

Species Group:

Guild Group: Bumble Bees

Conservation Target: Bumble Bees

Conservation Status

State:

S_Rank:

Federal:

G_Rank:

Population Status

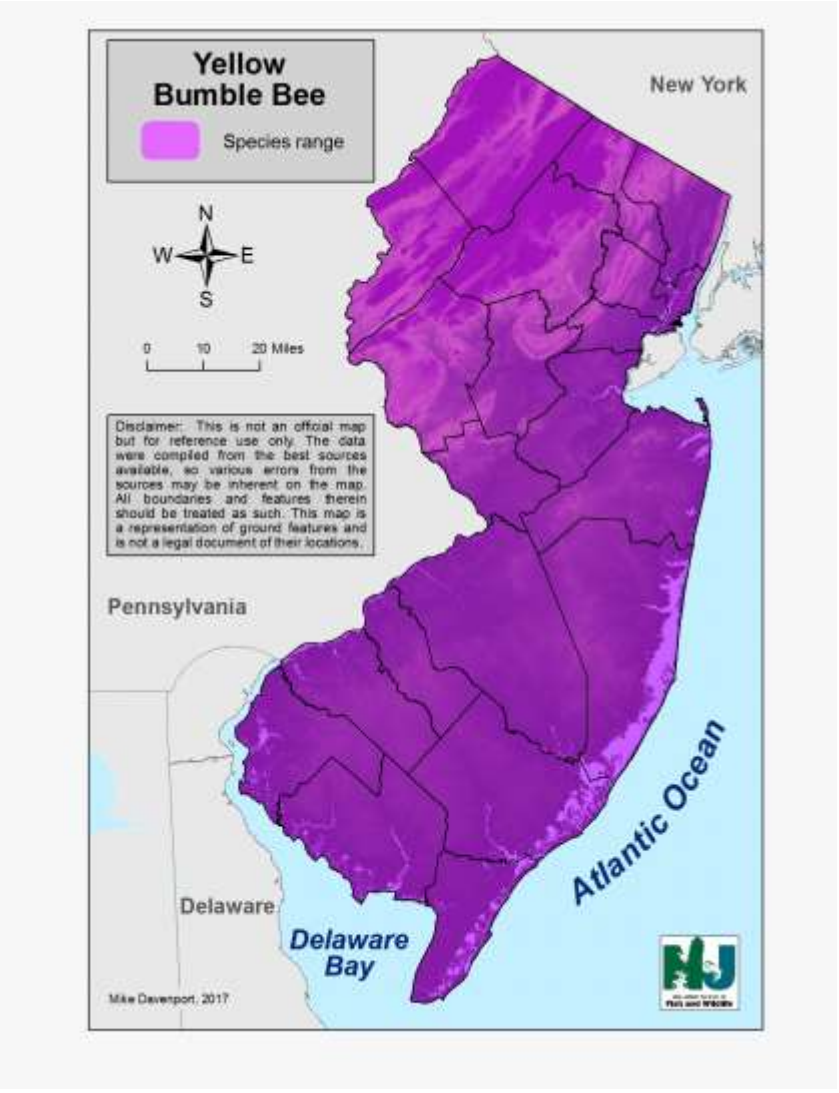
Abundance: Uncommon

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Forest	X
Grassland	X
Shrub	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
		x	x	x	x

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Williams, P., R. Thorp, L. Richardson, and S. Colla. 2014. An Identification Guide: Bumble Bees of North America. Princeton University Press. Princeton, N.J.	☑	☑	☐
Schweitzer, D.F., N.A. Capuano, B.E. Young, and S.R. Colla. 2012. Conservation and management of North American bumble bees. NatureServe, Arlington, Virginia, and USDA Forest Service, Washington, D.C. Available from https://www.fs.fed.us/wildflowers/pollinators/documents/ConsMgmtNABumbleBees.pdf	☐	☐	☑

Yellow Lampmussel

Lampsilis cariosa

The Yellow Lampmussel is a State Threatened freshwater mussel species. It prefers large rivers that drain more than 1,200 sq. kilometers and is often found in sand/silt or cobble substrates. Heavy shell morphology allows the species to inhabit high flow waterways and makes individuals resistant to crushing. As with most freshwater mussels, the Yellow Lampmussel requires particular host fish species to complete its life cycle. New Jersey occurrences of the species are restricted to the Delaware River, where they are especially vulnerable to dredging activities. The Yellow Lampmussel is threatened by habitat destruction, water quality degradation, and the invasion of aquatic species.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Macroinvertebrates

Taxa Sub Group: Aquatic Invertebrates

Species Group: Mussels

Guild Group: Freshwater Mussels

Conservation Target: Freshwater Mussels

Conservation Status

State: T

S_Rank: S2

Federal:

G_Rank: G3G4

Population Status

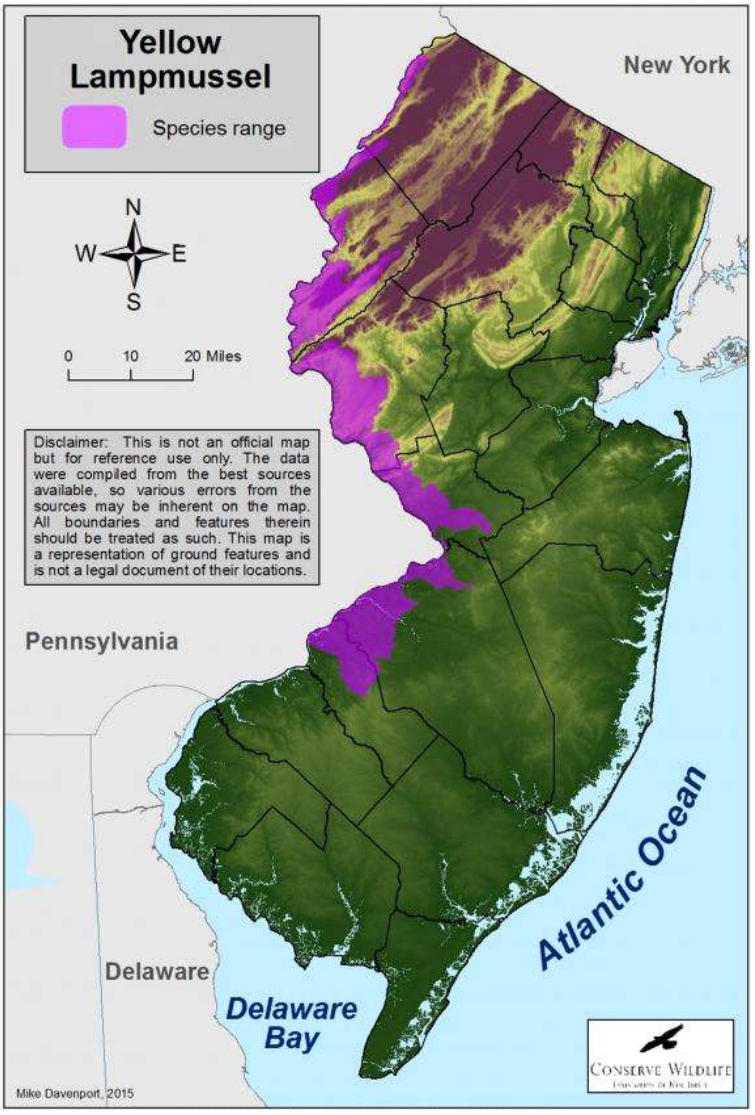
Abundance: Uncommon

Trend: Stable

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Warmwater Stream	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
			x		x

Is Landscape Project Mapping Available for this species? ☑

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
New Jersey Dept. of Environmental Protection Biotics Database. 2015. Trenton, N.J.	☑	☑	☐
Davenport, M. 2012. Species Status Review of Freshwater Mussels. Results Report for the NJ Endangered and Nongame Species Advisory Committee. Conserve Wildlife Foundation of New Jersey. Trenton, N.J.	☑	☑	☐
National Mussel Conservation Committee. 1998. National strategy for the conservation of native freshwater mussels. Journal of Shellfish Research 17(5):1419-1428.	☐	☐	☑

Yellow-banded Bumble Bee

Bombus terricola

The Yellow-banded Bumble Bee is an eastern and northern species of bumble bee that occurs in or adjacent to woodlands. This species nests underground. This species' range potentially includes New Jersey, and it has been declining in the northeastern portion of its range.

SWAP Classification

Broad Group: Terrestrial Wildlife

Taxon: Macroinvertebrates

Taxa Sub Group: Terrestrial Invertebrates

Species Group:

Guild Group: Bumble Bees

Conservation Target: Bumble Bees

Conservation Status

State:

S_Rank:

Federal:

G_Rank:

Population Status

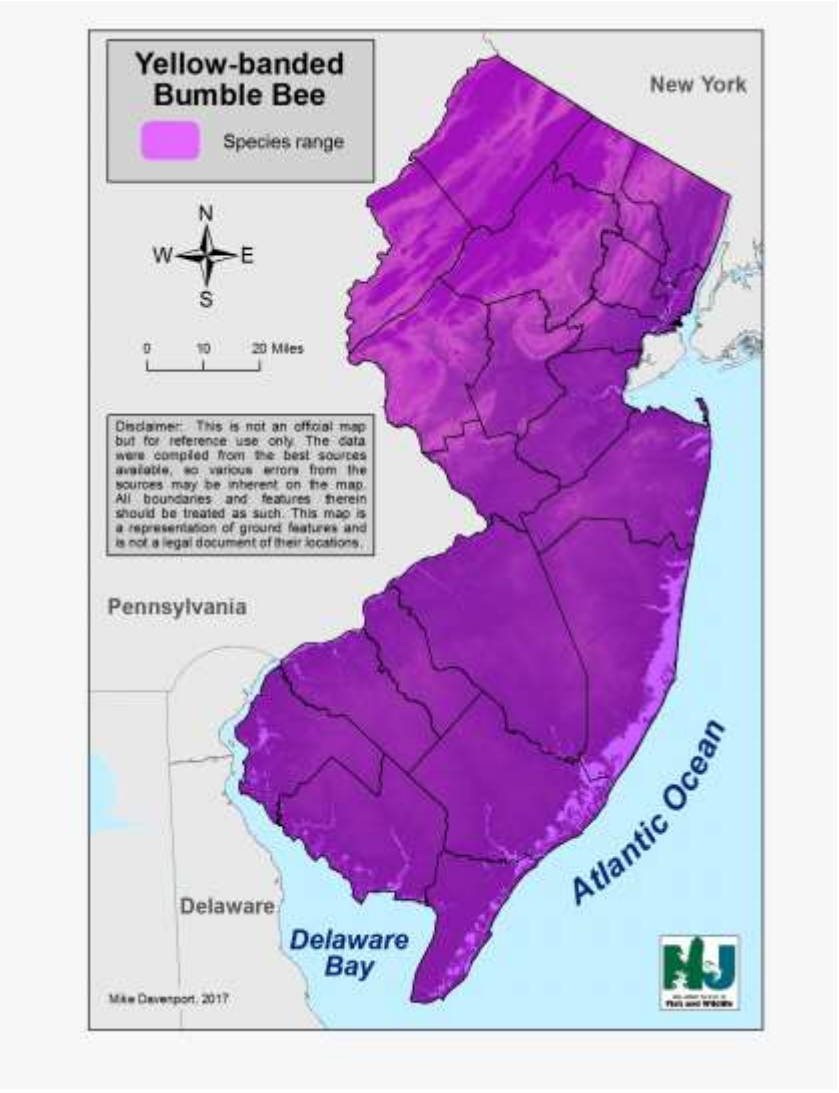
Abundance: Rare

Trend: Declining

Key Habitats

Habitats important to fulfilling the life history requirements of this focal species.

Habitat Type	Association
Forest	X
Grassland	X
Shrub	X



Landscape Regions important to fulfilling the life history requirements of this focal species.

Marine	Atlantic Coast	Delaware Bay	Piedmont InnerCoastal Plains	Pinelands	Skylands
		x	x	x	x

Is Landscape Project Mapping Available for this species? ☐

References supporting the identified abundance and/or population trend values, or additional plans addressing this focal species.

Reference	Abundance	Pop Trend	Plan
Schweitzer, D.F., N.A. Capuano, B.E. Young, and S.R. Colla. 2012. Conservation and management of North American bumble bees. NatureServe, Arlington, Virginia, and USDA Forest Service, Washington, D.C. Available from https://www.fs.fed.us/wildflowers/pollinators/documents/ConsMgmtNABumbleBees.pdf	☐	☐	☑
Williams, P., R. Thorp, L. Richardson, and S. Colla. 2014. An Identification Guide: Bumble Bees of North America. Princeton University Press. Princeton, N.J.	☑	☑	☐

This page intentionally left blank

Appendix E: Delineating Conservation Focal Areas

Delineating Conservation Focal Areas

The DFW enlisted internal and external stakeholders to inform the selection of GIS data and the method of analysis employed to delineate Conservation Focal Areas (CFAs). A wide variety of GIS data addressing biodiversity and habitat quality, connectivity, rarity and/or impairment within terrestrial, freshwater aquatic, and marine environs were found to be available at statewide and regional scales. To provide a regional context, the Department utilized a variety of conservation planning data compiled by the North Atlantic Landscape Conservation Cooperative (NALCC). Relevant regional data developed by NALCC partners included TNC's Geospatial Condition Analysis and UMass's Northeast Index of Ecological Integrity. These and other regional datasets served to complement the host of publicly available conservation-relevant state and local data in New Jersey. As applicable, a number of unpublished or derivative datasets were also utilized in developing CFAs.

The DFW decided to employ a weighted co-occurrence analysis that combines many independent datasets with different metrics to identify areas of high resource value. With some additional spatial optimization techniques, this approach allowed for the identification of specific geographic areas of agreement across a diverse set of geospatial data and metrics. These areas will be the focus of the DFW's assessment of threats and actions affecting New Jersey's wildlife habitats, and will identify locations where conservation actions can be carried out to benefit high priority fish and wildlife resources throughout the state.

General GIS Method – Phase 1

Once specific datasets were identified as having significant relevance to the CFA mapping objectives, data was acquired and necessary conversion and standardization processes were carried out in preparation for conducting a co-occurrence analysis. Where necessary, data were rescaled to New Jersey and reclassified into 30' grid cells. Inputs were then organized by three environments (terrestrial, freshwater aquatic, and marine) and into five categories (ecological condition, conservation infrastructure, fish and wildlife habitats, biodiversity and negative influences). For each input, metrics were reviewed by DFW biologists and converted into a standard weighting system which normalized all datasets to address the objectives of the CFA mapping process. Accordingly, weights were assigned following a standardized five tier scale ("5" being the highest value and "1" being the lowest) based upon factors which included (but were not limited to): the relevance of the data layer to our CFA mapping objectives, the degree to which the "regional" datasets addressed habitat values or conditions that were specific to New Jersey, and the original range of the source dataset values. The exception to the positive five tier scale included negative weights that ranged from -10 to -1 and a "restricted" category that excluded an area from being mapped as a CFA regardless of its intersection with one or more resource elements with positive values. Additionally, as the final mapping effort was based upon the "additive mapping" of valued habitats, the *proportion* to which any one dataset addressed a specific mapping objective needed to be factored in (i.e., if several datasets existed that were correlated with one specific issue, individual dataset weights were reduced to address confounding influences).

Phase 1 Process Summary:

- Compiled ~40 inputs spanning terrestrial, freshwater aquatic and marine environments from state and regional sources.
- Performed conversion, re-scaling and reclassification so that each input was standardized into 30' cells.
- Categorized data into five geodatabases: Ecological Condition, Conservation Infrastructure, Fish & Wildlife Habitats, Biodiversity and Negative Influences.
- Assigned relative importance (weights) to each input.

General GIS Method – Phase 2

Once inputs were reclassified according to assigned weights into 30' grid cells, a (weighted) co-occurrence analysis was performed that calculated the sum of all inputs. The resultant grid was then stratified by Landscape Region and rescaled by calculating percentile values for each cell relative to every other cell within the region. Cells were reclassified according to percentile ranks. For example, percentile values 0.90-1.00 were classified as the 90^{th} percentile, 0.80-0.89 were classified as the 80^{th} percentile and so forth.

Phase 2 Process Summary:

- Performed weighted co-occurrence analysis that combines inputs to identify areas where several different qualities are present ("resource-rich" areas).
- Stratified by Landscape Regions (calculated percentile ranks relative to each region) in order to have even distribution of areas between regions.

General GIS Method – Phase 3

Areas that represented the top 70 percent of the data within each region were extracted and converted to vector data made up of contiguous polygons. Terrestrial areas smaller than 3.14 acres were removed from the result (there was no size threshold applied to aquatic areas). The remaining polygons served as core areas from which geoprocessing routines were applied to identify key connections (e.g., riparian corridors) and proximate areas within the 50^{th} percentile or above. Identified areas were combined/dissolved with the core areas and generalization routines were run to create protective buffers and smooth boundaries of resultant contiguous polygons. Regional Conservation Opportunity Areas (RCOA) or "Nature's Network" data on terrestrial, wetland and aquatic cores developed during the process of creating CFAs was used as a guide to incorporate some additional areas that were not captured in the initial CFA delineation. Lastly, urban areas were erased from the result and a minimum size threshold of 3.14 acres was applied to all contiguous areas.

Phase 3 Process Summary:

- Extracted percentile $\geq$ 70 in each Landscape Region
- Applied minimum size criteria to identify core areas
- Applied connectivity rules to select key connections between high value areas
- Ran basic generalization/simplification processes to provide protective buffers and smooth boundaries of areas
- Utilized RCOA ("Nature's Network") data on terrestrial and aquatic cores as guide to add in areas not captured
- Erased all areas coded as "urban" in 2012 land-use/land-cover
- Applied minimum size criteria to all contiguous areas

A graphic that depicts the Conservation Focal Area development process is available at: http://www.state.nj.us/dep/fgw/ensp/wap/pdf/cons_focal_areas.pdf

Terrestrial Datasets Selected

Generally, GIS datasets available for terrestrial landscapes spoke to issues of habitat types, or degrees or measures of habitat quality or impairment. Among the datasets that addressed "habitat types," the most basic were layers produced by the State of New Jersey identifying core forest, grassland, wetland and shrub habitats (derived from 2012 land use/land cover data). While important indicators of space available to direct conservation actions and worthy of inclusion to the CFA mapping project, these were essentially considered a data "baseline," identifying generic habitats remarkable merely due to their size or habitat type. The relative importance or significance of all other available datasets were weighted in comparison to this baseline.

Table 1. Summary of terrestrial datasets selected by DFW biologists.

Conservation Infrastructure				
No	**Dataset**	**Merit**	**Relevance**	**Weight**
1	Preserved Lands Composite	Indicator of preserved lands (highly actionable areas).	Medium. One of few layers addressing open space.	3
2	Natural Areas	Indicator of preserved lands (highly actionable areas).	Medium. One of few layers addressing open space.	3
Ecological Condition				
No	**Dataset**	**Merit**	**Relevance**	**Weight**
9	Permeability - Regional Flow	Indicator of habitat connectivity, if perhaps the "courser" of several applied.	Medium/High. Ranked based upon categories of flow.	3 4 5
13	Metric Landscape Complexity	Indicator of habitat elevation diversity and wetland density, as it relates to availability for species habitat adaptation.	Low. Ranked in accordance with degree of varied topography.	1 2 3 4
14	Metric Landscape Context Index	Indicator of habitat quality based upon degree of proximate impairment.	Low. Sliding scale based upon dataset, values typically on low end of scale.	1 2 3 4 5
15	Metric Local Connectedness	Indicator of habitat connectivity.	Medium/High	1 2 3
16	Northeast Index of Ecological Integrity	Very good indicator of habitat quality and sustainability.	High. Sliding scale based upon dataset.	1 2 3 4 5
Fish & Wildlife Habitats				
No	**Dataset**	**Merit**	**Relevance**	**Weight**
6	All habitats (core forest, grassland, wetland scrub/shrub, beach/dune, and water)	Indicator of generic, actionable habitat types/ Considered a "baseline" with which to base other terrestrial dataset weights.	Medium/Low.	2

(Table 1 continued)

Fish & Wildlife Habitats *(continued)*				
No	**Dataset**	**Merit**	**Relevance**	**Weight**
7	Vernal Habitat	Indicator of habitat quality. Includes some species reference.	Medium/High. Two possible ranks, based upon vernal pool "certification" status.	4
				2
11	LNDR (Landscape Project)	Indicator of biodiversity, habitat quality and use by E&T species.	Low.	2
12	Habitats of High Regional Responsibility for NJ	Indicated habitat for which NJ has high regional responsibility.	High. Ranked in accordance with degree of State responsibility.	5
				4
				3
Biodiversity				
No	**Dataset**	**Merit**	**Relevance**	**Weight**
3	Natural Heritage Priority Sites	Very good indicator of quality and rarity, includes some species occurrence data.	High. Sliding scale based upon priority site significance.	5
				4
				3
8	Species Richness by Landscape Project Habitat Patches	Indicator of habitat size and quality per richness of "endangered," "threatened" or "special concern" species by LP 3.1 habitat patch.	Low. Sliding scale based upon richness indices.	5
				4
				3
				2
				1
10	Terrestrial Richness by road-bound block	Species richness data, indicator of habitat quality and diversity.	High, ranked on a sliding scale reflecting species richness.	5
				4
				3
				2
				1
Negative Influences				
No	**Dataset**	**Merit**	**Relevance**	**Weight**
4	Human Influences: Developed Lands	Indicator of impairment and barriers to connectivity.	High "negative" relevance. Use as restricting layer.	Restricted
				-10
				-5
5	Human Influences: Roads	Indicator of impairment and barriers to connectivity.	High "negative" relevance. Use as restricting layer.	Restricted
				-10
				-5

Freshwater Aquatic Datasets

Datasets available for freshwater aquatic landscapes largely addressed measures of habitat quality or impairment, suitability for SGCN species, or general species diversity. By their nature, aquatic habitats are typically mapped and valued as narrow, linear features in the landscape. Aquatic habitat mapping within the State has historically been much less abundant or detailed than that available for terrestrial landscapes. For example, the mapping of aquatic habitats – to the extent that it might suggest "patches" – does not address the varied and immensely relevant benthic or substrate characteristics of a watercourse in the same manner as is available for the mapping of terrestrial habitat patches. However, available water quality and

even species occurrence data can collectively speak to important parameters such as water temperature, clarity, chemistry and quality.

Table 2. Summary of the aquatic datasets selected by DFW staff.

Ecological Condition				
No	**Dataset**	**Merit**	**Relevance**	**Weight**
17	Category 1 waters (300' buffer)	Very good indicator of water quality, rare species use and focus on anti-degradation.	High. Good state-wide dataset.	5
19	Pinelands Streams (300' buffer)	Very good identification of water quality and unique water quality parameters.	High, if only for the Pinelands. Balances Trout Production Waters data layer.	5
25	Ambient Biomonitoring Network	Very good indicator of biodiversity and habitat quality	High.	3 2 1
26	Metric Riparian Landcover (90-meter buffer)	Indicator of impairment.	Low-Medium. Used to identify unimpaired aquatic habitats.	4 3 2 1
27	Metric Impervious Surfaces (90-meter buffer)	Indicator of impairment.	Low-Medium. Used to identify unimpaired aquatic habitats.	3 2 1
Biodiversity				
No	**Dataset**	**Merit**	**Relevance**	**Weight**
23	Aquatic Richness by HUC 14	Very good indicator of biodiversity and habitat quality.	High.	5 4 3 2 1
24	Streams and Waterbodies ranked by Aquatic Species	Indicator of biodiversity and SGCN species use of riparian corridors.	Medium-High.	5 4 3 2 1
Fish & Wildlife Habitats				
No	**Dataset**	**Merit**	**Relevance**	**Weight**
18	Trout Production water (300’ buffer)	Excellent indicator of water quality and species biodiversity.	High, if primarily for the northern half of state. Balances with Pinelands Streams layer.	5
20	Freshwater Mussel Habitat (300' buffer)	Very good indicator of water quality, benthic habitat types and biodiversity.	High.	4
21	Odonate Streams (300’ buffer)	Good indicator of biodiversity and habitat quality.	Medium-High.	4
22	Diadromous Fish Streams(300’buffer)	Good indicator of biodiversity and habitat quality.	High.	5

Marine Datasets

The intent of the DFW's mapping of "marine CFA's" within its SWAP is to identify *aquatic* marine habitats, including Barnegat Bay and relevant portions of the State's other major bays, such as the Delaware, Raritan and Great Bays. Coastal/intertidal wetlands or shorelines and freshwater/brackish estuarine systems, for example, are *not* mapped as "marine" CFA's, but rather by the "terrestrial" or "aquatic" CFA data layers, respectively. Some exceptions may be evident, such as the identification of seal haul-out sites, which are not literally "aquatic." But such habitats that are intrinsically linked to the aquatic species in the marine CFAs are most relevant in the marine CFA mapping. As was the case with available freshwater aquatic resource data layers, marine aquatic data availability is not quite as robust as that for terrestrial layers. It is worth noting that marine data layers generally did not include details of specific habitat types, benthic conditions or habitat diversity in the same manner as terrestrial habitat data. While there were data sets available for some key marine habitats (such as eelgrass [*Zostera marina*]*)* beds or artificial reef sites), much of the data that created the SWAP marine CFA mapping was specific to species occurrence data that served to highlight areas of high quality habitat or biodiversity.

Table 3. Summary of the marine datasets selected by DFW staff.

Conservation Infrastructure				
No.	**Dataset**	**Merit**	**Relevance**	**Weight**
35	The Marine Protected Areas Inventory	Indicates areas protected for a marine conservation purpose	Medium/High	3
Biodiversity				
No.	**Dataset**	**Merit**	**Relevance**	**Weight**
28	Submerged Aquatic Vegetation	Excellent indicator of habitat supporting biodiversity	High	5 4
29	Marine Species Richness by 1.3km grid	Very good indicator of general marine biodiversity.	Medium-High	5 4 3
31	Artificial Reef Sites	Good indicator of unique habitat and location of increased biodiversity.	Med-High. Dataset somewhat limited.	4
36	Back-bay and Estuarine Waterbody Spawning Access Areas	Designates specific areas utilized by anadromous fish to access back-bay and estuarine waterbodies (for spawning, etc.)	High	5
37	Shipwreck Dense Areas	Good indicator of unique benthic habitat and location of increased biodiversity.	Medium. Sliding scale based on dataset.	3 3 2
38	Sportfishing Areas	Indicates areas historically proven to represent productive and diverse fish habitats	Medium	2
39	Ocean Trawl Species Rich Areas	Indicates areas of high biological diversity as well as a "source population" for recovered habitats.	Medium/High	3
40	Seabird Annual Average Abundance Composite	Predictive indicator of seabird abundance throughout the entire "marine" CFA region.	Medium	5 4 3 2 1

(Table 3 continued)

Fish & Wildlife Habitats				
No.	**Dataset**	**Merit**	**Relevance**	**Weight**
30	Seal Haul-out Sites	Excellent indicator of unique habitat conditions critical to marine mammals.	Medium-High	4
32	Hard Clam Distribution in Barnegat Bay, 2012	Species-based indicator of habitat type.	Low	1
33	Mullica River/Great Bay/Delaware Bay Oysters	Species-based indicators of habitat type.	Low	1
Negative Influences				
No.	**Dataset**	**Merit**	**Relevance**	**Weight**
34	Mullica River/Great Bay Leases	Designates areas of anticipated anthropogenic activity/disturbance.	Medium "negative" relevance.	-5
41	Shipping Density (all vessels)	Indicator of marine environment stressors or impairment.	Low to Medium negative relevance.	-5 -10

As was noted in the body of the plan, these datasets represent the first draft of CFA maps, and maps may be further developed or refined in the future as new GIS data become available or as use and implementation of the maps reveals opportunities for refinement or improvements.

Table 4. Master list of datasets employed in the development of Conservation Focal Areas (CFAs).

No.	Dataset	Categories	Weight	Source	URL	Description	Notes
1	**Preserved Lands Composite**		3	DEP - derived from publicly available state open space and other sources	See Notes	This layer is a composite of protected open space and recreation areas owned in fee simple interest by the NJDEP that have a high likelihood of being managed for wildlife conservation and acquired lands of USFWS.	Derived from multiple sources including: http://njogis-newjersey.opendata.arcgis.com/datasets/b75fe11ed90543c1b4ee87e66af63b8b_1; http://njogis-newjersey.opendata.arcgis.com/datasets/9603495beb394997b7bd441b7bcbcdbe_2; http://www.fws.gov/GIS/Data/CadastralDB/index_cadastral.html; https://gapanalysis.usgs.gov/padus/
2	**Natural Areas**		3	DEP - unpublished	NA	This layer includes areas of land or water, owned in fee simple or held as a conservation easement by the Department, which has retained its natural character, although not necessarily completely undisturbed, or having rare or vanishing species of plant and animal life, or having similar features of interest. All the natural areas are worthy of preservation for present and future residents of the State.	http://www.state.nj.us/dep/parksandforests/natural/natareas.html
3	**Natural Heritage Priority Sites**	B1/B2/B3	5	DEP	http://www.nj.gov/dep/gis/stateshp.html#PRIORITY	This layer identifies critically important areas to conserve New Jersey's biological diversity, with particular emphasis on rare plant species and ecological communities.	
		B4	4				
		B5	3				

(Table 4 continued)

No.	Dataset	Categories	Weight	Source	URL	Description	Notes
4	**Human Influences: Developed Lands**	Developed	R	DEP - derived from NJDEP 2012 LULC	http://www.nj.gov/dep/gis/lulc12c.html	Developed lands and associated buffers. This layer is derived from the 2012 Land Use/Land Cover, which includes all the Residential (1100), Commercial & Services (1200), Industrial (1300), Industrial & Commercial Complexes (1500), Mixed Urban Or Built-Up (1600), and part of Transportation, Communication & Utilities (1400), Other Urban Or Built-Up (1700), and Recreational Land (1800).	Urban LULC was coded as "restricted" (R). 90-meter buffers were applied and given a weight of -5 or -10 depending on the class. See URBAN_ROADS tab for weight applied for each class.
		High Density Dev buffer	-10				
		Low Density Dev buffer	-5				
5	**Human Influences: Roads**	Major Roadway (Paved Area)	R	DEP - derived from NJDOT/NJOIT	https://njgin.state.nj.us/NJ_NJGINExplorer/jviewer.jsp?pg=ROADS	Roadways and associated buffers. This layer represents all the segmented Road Centerlines of New Jersey. In the analysis, all the roads are divided into three subgroups, which are state, county, and local roads.	Local roads were buffered by 15 feet and were coded with a weight of -5. Major Roadway lines classified as 500 and 600 Series County Routes were buffered by 25 feet, while lines classified as Interstate Highways, U.S. Routes, NJ State Highways and Toll Authority Routes were buffered by 37.5 feet. These road widths are intended to capture the paved area and were determined by randomly selecting roads and averaging measured widths using aerial imagery. These areas were coded as "restricted" (R). 500 and 600 Series County Routes were then buffered from 25 feet to 320 feet and the buffer area was coded with a weight of -5. Interstate Highways, U.S. Routes, NJ State Highways and Toll Authority Routes were buffered from 37.5 feet to 332.5 feet and the buffer area was coded with a weight of -10.
		Interstate and State Highway buffer	-10				
		Local Roadways (Paved Area) and County Highway buffer	-5				

(Table 4 continued)

No.	Dataset	Categories	Weight	Source	URL	Description	Notes
6	**All habitats**		2	DEP	http://www.nj.gov/dep/gis/lulc12c.html	This layer is derived from the 2012 Land Use/Land Cover, which includes core forest habitat, grassland habitat, wetlands, scrub/shrub, beach/dune and water.	
7	**Vernal Habitat**	Potential vernal habitat area	2	DEP -derived from publicly available Landscape Project	http://www.nj.gov/dep/gis/landscape.html	Derived from the Landscape Project (Version 3.1), identifies not only vernal and potential vernal pools themselves, but also surrounding habitat that allows for successful breeding, dispersal, foraging, overwintering, and migration of species that use vernal pools.	
		Vernal habitat area	4				
8	**Species Richness by Landscape Project Habitat Patches**	1	1	DEP -derived from publicly available Landscape Project	http://www.nj.gov/dep/gis/landscape.html	The number of unique species, with a status of E, T, or SC, was calculated for each habitat patch mapped in the Landscape Project (Version 3.1).	
		2	2				
		3	3				
		4-9	4				
		10-41	5				
9	**Permeability - Regional Flow**	0.2-0.4	3	TNC	https://databasin.org/datasets/fdc23d43823048c7bca96fce686ee79f	This layer identifies potential larger-scale directional movements and pinpoints the areas where they are likely to become concentrated, diffused, or rerouted, due to the structure of the landscape.	The source simplified "grouped" data can be downloaded at https://databasin.org/datasets/e74298bce3fc441490d246a8f17a4a28 The full dataset can be downloaded at https://databasin.org/datasets/fdc23d43823048c7bca96fce686ee79f
		0.4-0.7	4				
		0.7-1.0	5				
10	**Terrestrial Richness by roadbound block**	1	1	DEP - unpublished	NA	The number of unique focal species categorized as terrestrial was calculated for each minor road bounded block.	Species data includes a Terrestrial_Rich field that shows species considered.
		2	2				
		3	3				
		4-7	4				
		8-22	5				

(Table 4 continued)

No.	Dataset	Categories	Weight	Source	URL	Description	Notes
11	**LNDR (Landscape Project)**	3,4,5	2	DEP -derived from publicly available Landscape Project	http://www.nj.gov/dep/gis/landscape.html	Habitat patches ranked 3, 4, or 5 derived from the Landscape Project (Version 3.1). It contains species-specific patches that have one or more occurrences of State threatened species, State endangered species, or wildlife listed as endangered and threatened pursuant to the Federal Endangered Species Act of 1973.	
12	**Habitats of High Regional Responsibility for NJ**	95%-100%	5	TNC-Geospatial Condition Analysis	https://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/edc/reportsdata/terrestrial/habitatmap/Pages/default.aspx	This layer derived from the Terrestrial Habitat Map for the Northeast US. It represents the habitats which New Jersey contains at least 25% of the total habitat in the Northeast region.	See the Northeast Habitat Guide reports for the PCT breakdown by state: http://easterndivision.s3.amazonaws.com/NortheastHabitatGuides.pdf
		60%-94%	4				
		25%-59%	3				
13	**Metric Landscape Complexity**	0.2-0.4	1	TNC-Geospatial Condition Analysis	https://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/edc/Pages/geospatial.aspx	This layer is derived from Condition of the Northeast Terrestrial and Aquatic Habitats. It refers to the variety of landforms created by an area's topography, the range of its elevation gradients, and the density of its wetlands. Areas of high landscape diversity are important for the long-term population persistence of plants, invertebrates, and other species.	
		0.4-0.7	2				
		0.7-0.9	3				
		0.9-1.0	4				
14	**Metric Landscape Context Index**	0-0.1	5	TNC-Geospatial Condition Analysis	https://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/edc/Pages/geospatial.aspx	This layer is derived from Condition of the Northeast Terrestrial and Aquatic Habitats. It quantifies the degree of human conversion of natural landcover in the immediate neighborhood of that cell on the landscape.	
		0.1-0.3	4				
		0.3-0.5	3				
		0.5-0.7	2				
		0.7-0.8	1				

(Table 4 continued)

No.	Dataset	Categories	Weight	Source	URL	Description	Notes
15	**Metric Local Connectedness**	0.3-0.5	1	TNC-Geospatial Condition Analysis	https://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/edc/Pages/geospatial.aspx	This layer is derived from Condition of the Northeast Terrestrial and Aquatic Habitats. It estimates the degree of permeability, or conversely the degree of resistance, surrounding each cell in the region.	
		0.5-0.8	2				
		0.8-1.0	3				
16	**Northeast Index of Ecological Integrity**	0.2-0.3	1	UMASS	https://nalcc.databasin.org/datasets/f577118c89244e7e92290623087 69e76	This dataset depicts the ecological integrity of locations (represented by 30 m grid cells) throughout the northeastern United States based on environmental conditions existing in approximately 2010. Ecological integrity is defined as the ability of an area (e.g., local site or landscape) to sustain important ecological functions over the long term. In particular, the functions include the long-term ability to support biodiversity and the ecosystem processes necessary to sustain biodiversity.	Included is a product rescaled for NJ. The source data (updated March 1, 2017) can be downloaded at: https://nalcc.databasin.org/datasets/f577118c89244e7e9229062308769e76
		0.3-0.5	2				
		0.5-0.7	3				
		0.7-0.9	4				
		0.9-1.0	5				
17	**Category 1 (plus 90 meter buffer)**	C1	5	DEP - derived from publicly available Surface Water Quality Standards	http://www.nj.gov/dep/gis/stateshp.html#SWQS	This layer was derived from New Jersey's Surface Water Quality Standards. It represents all the Category 1 (C1) waters. All C1 streams and waterbodies were buffered by 90 meters in order to capture surrounding riparian areas.	
18	**Trout Production (plus 90 meter buffer)**	TP	5	DEP - derived from publicly available Surface Water Quality Standards	http://www.nj.gov/dep/gis/stateshp.html#SWQS	This layer was derived from New Jersey's Surface Water Quality Standards. It represents all the trout production (TP) waters. All TP streams and waterbodies were buffered by 90 meters in order to capture surrounding riparian areas.	

(Table 4 continued)

No.	Dataset	Categories	Weight	Source	URL	Description	Notes
19	**Pinelands Streams (plus 90 meter buffer)**	PL	5	DEP	http://www.nj.gov/dep/gis/stateshp.html#SWQS	This layer was derived from New Jersey's Surface Water Quality Standards. It represents all the streams in the Pinelands Region (PL). All PL streams were buffered by 90 meters in order to capture surrounding riparian areas.	
20	**Freshwater Mussel Habitat (plus 90 meter buffer)**		4	DEP -derived from publicly available Landscape Project	http://www.nj.gov/dep/gis/landscape.html	This layer is derived from the Landscape Project (Version 3.1), which represents the stretches of stream that serve as habitat for endangered, threatened, and special concern freshwater mussel species. All freshwater mussel waters were buffered by 90 meters in order to capture surrounding riparian areas.	
21	**Odonate Streams (plus 90 meter buffer)**		4	DEP - unpublished	NA	This layer represents the stretches of stream that serve as habitat for endangered, threatened, and special concern odonate species. All odonate waters were buffered by 90 meters in order to capture surrounding riparian areas.	
22	**Diadromous Fish Streams (plus 90 meter buffer)**		5	TNC-Geospatial Condition Analysis	https://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/edc/Pages/geospatial.aspx	Includes: documented current freshwater habitat (spawning and overwintering) for at least one of the following diadromous fish: alewife, American shad, blueback herring, hickory shad, striped bass, Atlantic sturgeon, and/or Atlantic salmon.	

(Table 4 continued)

No.	Dataset	Categories	Weight	Source	URL	Description	Notes
23	**Aquatic Richness by HUC14**	1	1	DEP - unpublished	NA	The number of unique species categorized as aquatic was calculated for the streams and waterbodies within each HUC 14.	This layer conflates the unique species count from each HUC 14 to all water features (buffered by 300 ft.) within each HUC 14. Species data includes an Aquatic_Ranked field that shows species considered. Aquatic_R_Metric shows rank assigned to species.
		2	2				
		3	3				
		4-6	4				
		7-11	5				
24	**Streams and Waterbodies ranked by Aquatic Species**	S common	1	DEP - unpublished	NA	Streams and Waterbodies from the National Hydrography Dataset (NHD) were buffered by 90 meters and combined to create an "aquatic habitat" base layer. Using species data as a guide, the layer was hand-edited to estimate appropriate areas of habitat. Aquatic species data was then spatially joined to the habitat layer in order to assign the maximum rank (based primarily on species status) of the species present to the intersecting habitat area.	Species data includes an Aquatic_Ranked field that shows species considered. Aquatic_R_Metric shows rank assigned to species.
		S not common	2				
		SC/SC/S	3				
		T/T/SC	4				
		E/ET	5				
25	**Ambient Biomonitoring Network**	Fair	1	DEP	http://www.nj.gov/dep/gis/stateshp.html#AMNET	This layer represents point sites sampled by NJDEP as part of its Ambient Biomonitoring Network (AMNET). Sites are sampled in every Watershed Management Area (WMA) in the State. Historically, the New Jersey Impairment Score (NJIS), based on family level taxonomy, was used for the entire state to make assessments at three levels of impairment; non-impaired, moderately impaired, and severely impaired. NHD stream segments were coded with impairment scores and a buffer of 90 meters was applied.	
		Good	2				
		Excellent	3				

(Table 4 continued)

No.	Dataset	Categories	Weight	Source	URL	Description	Notes
26	**Metric Riparian Landcover (90-meter buffer)**	0-1	4	USGS/DEP - unpublished	NA	The riparian zone is the land area directly adjacent to a stream or river and subject to its influence. The amount of agriculture and developed land within each riparian buffer zone by overlaying the 2011 National Landcover dataset on the 90-meter stream buffers.	To assess the amount of conversion in riparian lands around streams and waterbodies, we calculated the amount of agriculture and developed land within each riparian buffer zone by overlaying the 2011 National Landcover dataset on the 90 meters riparian buffers. We also transformed the landcover information into a summary impact index by summing the percent of development and agriculture in the buffer zone, and weighting the effect of medium to high intensity development twice as much as of agriculture: Impact= 0.5 * % agriculture + 0.75* % low intensity development+ 1.0* % medium to high intensity development. The impact index ranged from 100 for a watershed with its buffer zone totally developed to 0 where the buffer zone was completely within natural cover. National Landcover Dataset 2011 classes were classed as follows: Low Intensity Developed = 21, 22, 31 (revised non-natural barren class), Medium to High Intensity Developed = 23, 24, Agriculture = 81, 82, Forest = 41, 42, 43, Wetland = 90, 95, Open / Grassland/ Shrubland = 32, 52, 71.
		1-10	3				
		10-25	2				
		25-50	1				

(Table 4 continued)

No.	Dataset	Categories	Weight	Source	URL	Description	Notes
27	**Metric Impervious Surfaces (90-meter buffer)**	CLASS 1	3	USGS/DEP - unpublished	NA	Impervious surfaces are hard substrates like paved roads, parking lots, and roof tiles. The amount of impervious cover for each stream segment and waterbody using the 2011 National Landcover Impervious Surface Dataset.	To examine impervious surfaces in the state, we summarized the amount of impervious cover for each stream segment and waterbody using the 2011 National Landcover Impervious Surface Dataset. We grouped each stream and waterbody into one of four impact categories. Percent Imperviousness Impact Categories: Class 1: Undisturbed: 0 < 0.5% Class 2: Low impacts: 0.5-2% Class 3: Moderate Impacts: >=2-10 % Class 4: High Impacts: >=10% The NLCD 2011 Percent Developed Imperviousness values were first converted to impervious area. Then, the impervious grid was clipped and snapped to the NHDPlus catchments that the impervious surface area grid was allocated by summing the area of impervious surface within each catchment. The percent impervious for each catchment was calculated as follows: (allocated impervious area)/(catchment area)×100%
		CLASS 2	2				
		CLASS 3	1				
28	**Submerged Aquatic Vegetation**	SAV: 40-100% cover	5	Rutgers	http://crssa.rutgers.edu/projects/sav/downloads.html	This layer represents submerged aquatic vegetation (SAV) of the Barnegat Bay - Little Egg Harbor estuary, from 2003 to 2009. The three classes of SAV are: 1) Dense (80% - 100% cover), 2) Moderate (40% - 80% cover), and 3) Sparse (10% - 40% cover).	Grant F. Walton Center for Remote Sensing and Spatial Analysis (CRSSA), Rutgers University. 2011. Submerged aquatic vegetation (SAV) CRSSA image classification of the Barnegat Bay - Little Egg Harbor estuary, New Jersey: 2009
		SAV: 10-40% cover	4				

(Table 4 continued)

No.	Dataset	Categories	Weight	Source	URL	Description	Notes
29	**Marine Species Richness by 1.3km grid**	1	3	DEP - unpublished	NA	The number of unique focal species categorized as marine was calculated for each 1.3 x 1.3-kilometer cell in the "Marine Waters" grid derived from the Landscape Project.	Species data includes a Marine_Rich field that shows species considered.
		2-3	4				
		4-7	5				
30	**Seal Haul-out Sites**		4	DEP - unpublished	NA	Seal Haul-out areas.	Contact: Jeanette Bowers, DFW-ENSP
31	**Artificial Reef Sites**		5	DEP - unpublished	NA	Artificial reefs represent man-made, long-term bottom structure that can provide a surface for corals and habitat for various structure-dependent fish species. All state-constructed artificial reef sites were assigned a CFA Rank of 5. Reefs also provide sites for recreational activities such as fishing and scuba-diving as well as small-scale commercial fishing operations. Reefs are typically funded by tax-payers in the form of sport-fishing subsidies and therefore represent a high-value public investment.	http://www.nj.gov/dep/fgw/refloc00.htm#sites
32	**Hard Clam Distribution in Barnegat Bay, 2012**		1	DEP - unpublished	NA	Unpublished Shellfisheries data.	http://www.nj.gov/dep/fgw/shelhome.htm, contact Kira Dacanay
33	**Mullica River/Great Bay/Delaware Bay Oysters**		1	DEP - unpublished	NA	Unpublished Shellfisheries data.	http://www.nj.gov/dep/fgw/shelhome.htm, contact Kira Dacanay
34	**Mullica River/Great Bay Leases**		-5	DEP - unpublished	NA	Unpublished Aquaculture data.	http://www.nj.gov/dep/fgw/shelhome.htm, contact Kira Dacanay

(Table 4 continued)

No.	Dataset	Categories	Weight	Source	URL	Description	Notes
35	**The Marine Protected Areas Inventory**		3	NOAA	http://marineprotectedareas.noaa.gov/helpful_resources/inventory.html	The Marine Protected Areas Inventory (MPA Inventory) is a comprehensive geospatial database designed to catalog and classify marine protected areas within US waters. The MPA Inventory was developed with extensive input from state and federal MPA programs, and drawn from other publicly available data.	
36	**Back-bay and Estuarine Waterbody Spawning Access Areas**		5	DEP - unpublished	NA	Direct ocean access "Primary" sites were designated by an area with a radius twice that of the minimum width of the passage. All other "Secondary" access sites were designated by an area with a diameter equal to the minimum width of the passage. All areas were assigned a CFA Rank of 5. Access of the ocean to and from the bays and rivers is critical to the life history of a multitude of fish species for the needs of spawning and migration events.	New Jersey Marine Fisheries Administration
37	**Shipwreck Dense Areas**	3	2	NOAA/AWOIS	https://nauticalcharts.noaa.gov/data/wrecks-and-obstructions.html	Recorded shipwrecks were examined by the density in which they coexisted. The top 20% of the densest shipwreck areas received a 250 meter radius buffer surrounding each shipwreck. CFA Ranks were calculated by standardizing the inverse of the area per wreck at each site to a maximum of 3. Shipwrecks provide long-term, small area bottom structure that have the potential to function as reefs, providing surface for corals and habitat for various structure-dependent fish species. Also provide sites for recreational activities such as fishing and scuba-diving.	
		4	3				
		6	3				

(Table 4 continued)

No.	Dataset	Categories	Weight	Source	URL	Description	Notes
38	**Sport fishing Areas**		2	DEP	http://www.state.nj.us/dep/gis/stateshp.html#SPORTFISH	The Department first mapped prime fishing areas in the 1980s, and in 2003 updated the data by surveying charter boat, party boat, and private boat captains to identify the areas they consider recreationally significant fishing areas or prime fishing areas. All areas were assigned a CFA Rank of 2. Prime fishing areas have a demonstrable history of supporting a significant local quantity of recreational and commercial fishing activity.	New Jersey Marine Fisheries Administration
39	**Ocean Trawl Species Rich Areas**		3	DEP - unpublished	NA	A total of the number of fish species caught between 2010 and 2015 was calculated from the New Jersey Ocean Stock Assessment Survey (a groundfish trawl survey) at each surveyed site. A density raster was created from this data and the top 10% was isolated and defined as an area of high species richness. All areas were assigned a CFA Rank of 3. Areas of high species richness can function as emigration sources to lower species-rich areas if those habitats become suitable. High biological diversity can function as an indicator of a healthy ecosystem.	New Jersey Marine Fisheries Administration

(Table 4 continued)

No.	Dataset	Categories	Weight	Source	URL	Description	Notes
40	**Seabird Annual Average Abundance Composite**	0-0.2	1	NOAA	https://marinecadastre.gov/data/	The data represent predicted number of individuals of each listed seabird species per standardized survey segment (15-minute travel time at 10 knots = approx. 2.5 nautical miles (Nm) or 2.9 statute miles.) Therefore, if the average annual abundance number for a species is 0.2-0.3, then this model estimates that, on average, a single animal would be seen for every 3.3 - 5 survey segments conducted at randomly selected times of the year. Note that some species models were not estimated for all seasons due to very low/no abundance in those seasons, so the annual abundance is based only on the actual seasons modeled, assuming 0 abundance in other seasons. This data is a composite of the following 15 species: Common Eider, Common Loon, Long-tailed Duck, Northern Gannett, Razorbill, Red-throated Loon, Roseate Tern, White-winged Scoter, Black-legged Kittiwake, Black Scoter, Corys Shearwater, Great Shearwater, Leach's Storm Petrel and Red Phalarope.	Downloaded from: ftp://ftp.coast.noaa.gov/pub/MSP/AvianAverageAnnualAbundance.zip
		0.2-0.3	2				
		0.3-0.5	3				
		0.5-0.7	4				
		0.7-1.0	5				

(Table 4 continued)

No.	Dataset	Categories	Weight	Source	URL	Description	Notes
41	**Shipping Density (all vessels)**	1-6	-2	NOAA/USCG	https://marinecadastre.gov/data/	Automatic Identification Systems (AIS) are a navigation safety device that transmits and monitors the location and characteristics of many vessels in U.S. and international waters in real-time. These products represent vessel traffic from the Atlantic in 2013 from all vessels with AIS transponders. The densities are reported in 100-meter grid cells for all vessels and broken into nine vessel type groupings. Vessel groupings include: cargo, fishing, military, passenger, pleasure, tanker, tug-tow, other, and not available categories. The data are based on 2013 vessel track line data for the Atlantic, which is defined as UTM zones 17, 18, 19, and 20. The data are best interpreted using a high to low density scale and do not represent actual vessel counts.	Downloaded from: http://portal.midatlanticocean.org/data-catalog/maritime-industries/#layer-info-ais-shipping-data-2012
		6-7500	-5				

Appendix F: Habitat Crosswalks

Habitat Crosswalks

The *Habitat Crosswalks* are described in detail within Chapter 2, Section IV. They are based on two habitat classification system/mapping schemes:

1. The New Jersey Department of Environmental Protection's (DEP) land use/land cover data.
2. The Northeast Terrestrial Wildlife Habitat Classification System.

The ENSP's Landscape Project mapping, which remains the principal basis for the DFW's mapping of endangered, threatened and special concern wildlife species habitats, relies on New Jersey's land use/land cover data as a base layer. We decided to continue the use of the New Jersey land use/land cover mapping to describe and depict wildlife habitats in the context of this plan to make New Jersey's State Wildlife Action Plan relevant and accessible to New Jersey's users, and because we believe it to be more spatially precise than the Northeast Terrestrial Wildlife Habitat Classification System. This land use/land cover data set is used to characterize the Conservation Focal Areas (CFAs) and, at a broader scale of habitat types, to characterize the Focal SGCN habitat associations. However, we recognize the need to facilitate use of this plan at a multi-state or regional level and, therefore, we have provided a cross-walk to aid the translation between these two habitat classification/mapping schemes.

Following are two habitat crosswalks, including:

- A comparative association between DEP's land use/land cover data and the habitat categories used to characterize Focal SGCN habitat associations described in Chapter 1 and presented within the *Profiles of the Focal Species of Greatest Conservation Need,* Appendix D.
- A comparative association between the DEP's land use/land cover data and the Northeast Terrestrial Wildlife Habitat Classification System.

A third habitat crosswalk that focuses on the comparative association between the DEP's land use/land cover data and the habitat categories used to characterize Conservation Focal Areas can be found in Appendix G.

Table 1. Habitat crosswalk between DEP's land use/land cover habitat categories, the habitat categories used to characterize the CFAs, and the categories used to characterize SGCN habitat associations.

	New Jersey's Landscape Project - Andersen (1976) Level 3 LULC Categories	CFA Mapping Habitat Characterization Categories	Species Profile Habitat Categories
1	URBAN, RESIDENTIAL	NON-HABITAT	(n/a)
2	URBAN, RESIDENTIAL, HIGH DENSITY, MULTIPLE DWELLING	NON-HABITAT	(n/a)
3	URBAN, RESIDENTIAL, SINGLE UNIT, MEDIUM DENSITY	NON-HABITAT	(n/a)
4	URBAN, RESIDENTIAL, SINGLE UNIT, LOW DENSITY	NON-HABITAT	(n/a)
5	URBAN, RESIDENTIAL, RURAL, SINGLE UNIT	NON-HABITAT	(n/a)
6	URBAN, MIXED RESIDENTIAL	NON-HABITAT	(n/a)
7	URBAN, COMMERCIAL/SERVICES	NON-HABITAT	(n/a)
8	URBAN, MILITARY RESERVATIONS	NON-HABITAT	(n/a)
9	URBAN, NO LONGER MILITARY, USE TO BE DETERMINED	NON-HABITAT	(n/a)
10	URBAN, INDUSTRIAL	NON-HABITAT	(n/a)
11	URBAN, TRANSPORTATION/COMMUNICATIONS/UTILITIES	URBANHAB	(n/a)
12	URBAN, MAJOR ROADWAY	NON-HABITAT	(n/a)
13	URBAN, MIXED TRANSPORTATION CORRIDOR OVERFLAP AREA	NON-HABITAT	(n/a)
14	WATER, BRIDGE OVER WATER	NON-HABITAT	(n/a)
15	URBAN, RAILROADS	NON-HABITAT	(n/a)
16	URBAN, AIRPORT FACILITIES	URBANHAB	(n/a)
17	WETLANDS, WETLAND RIGHTS-OF-WAY (MODIFIED)	SHRUB WETLAND	WETLANDS
18	URBAN, UPLAND RIGHTS-OF-WAY (DEVELOPED)	SHRUB UPLAND	(n/a)
19	URBAN, UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	SHRUB UPLAND	GRASSLAND, SHRUB
20	URBAN, STORMWATER BASIN	NON-HABITAT	(n/a)

Table 1 continued

	New Jersey's Landscape Project - Andersen (1976) Level 3 LULC Categories	CFA Mapping Habitat Characterization Categories	Species Profile Habitat Categories
21	URBAN, INDUSTRIAL/COMMERCIAL COMPLEXES	NON-HABITAT	(n/a)
22	URBAN, MIXED URBAN OR BUILT-UP LAND	NON-HABITAT	(n/a)
23	URBAN, OTHER URBAN OR BUILT-UP LAND	URBANHAB	(n/a)
24	URBAN, CEMETERY	URBANHAB	(n/a)
25	WETLANDS, CEMETERY ON WETLAND	WETDIST	(n/a)
26	URBAN, PHRAGMITES DOMINATE URBAN AREAS	NON-HABITAT	(n/a)
27	WETLANDS, MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	WETDIST	WETLANDS
28	URBAN, RECREATIONAL LAND	URBANHAB	(n/a)
29	URBAN, ATHLETIC FIELDS (SCHOOLS)	NON-HABITAT	(n/a)
30	URBAN, STADIUM THEATERS CULTURAL CENTERS AND ZOOS	NON-HABITAT	(n/a)
31	WETLANDS, MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	WETDIST	WETLANDS
32	AGRICULTURE, CROPLAND AND PASTURELAND	GRASSLAND	GRASSLAND
33	WETLANDS, AGRICULTURAL WETLANDS (MODIFIED)	GRASSLAND	WETLANDS
34	WETLANDS, FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	SHRUB WETLAND	SHRUB, WETLANDS
35	AGRICULTURE, ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	GRASSLAND	(n/a)
36	AGRICULTURE, CRANBERRY BOGS	WETEMERG	WETLANDS
37	AGRICULTURE, CONFINED FEEDING OPERATIONS	GRASSLAND	(n/a)
38	AGRICULTURE, OTHER AGRICULTURE	GRASSLAND	(n/a)
39	FOREST, DECIDUOUS FOREST	UPLAND FOREST DEC	FOREST
40	FOREST, DECIDUOUS FOREST (10-50% CROWN CLOSURE)	UPLAND FOREST DEC	FOREST

Table 1 continued

	New Jersey's Landscape Project - Andersen (1976) Level 3 LULC Categories	CFA Mapping Habitat Characterization Categories	Species Profile Habitat Categories
41	FOREST, DECIDUOUS FOREST (>50% CROWN CLOSURE)	UPLAND FOREST DEC	FOREST
42	FOREST, CONIFEROUS FOREST	UPLAND FOREST CON	FOREST
43	FOREST, CONIFEROUS FOREST (10-50% CROWN CLOSURE)	UPLAND FOREST CON	FOREST
44	FOREST, CONIFEROUS FOREST (>50% CROWN CLOSURE)	UPLAND FOREST CON	FOREST
45	FOREST, PLANTATION	UPLAND FOREST CON	FOREST
46	FOREST, MIXED FOREST	UPLAND FOREST MIX	FOREST
47	FOREST, CONIFEROUS/DECIDUOUS FOREST	UPLAND FOREST MIX	FOREST
48	FOREST, MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	UPLAND FOREST MIX	FOREST
49	FOREST, MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	UPLAND FOREST MIX	FOREST
50	FOREST, DECIDUOUS/CONIFEROUS FOREST	UPLAND FOREST MIX	FOREST
51	FOREST, MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	UPLAND FOREST MIX	FOREST
52	FOREST, MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	UPLAND FOREST MIX	FOREST
53	FOREST, BRUSHLAND/SHRUBLAND	SHRUB UPLAND	FOREST, SHRUB
54	FOREST, OLD FIELD (< 25% BRUSH COVERED)	SHRUB UPLAND	FOREST, SHRUB
55	FOREST, PHRAGMITES DOMINATE OLD FIELD	SHRUB UPLAND	FOREST, WETLANDS
56	FOREST, DECIDUOUS BRUSH/SHRUBLAND	SHRUB UPLAND	FOREST, SHRUB
57	FOREST, CONIFEROUS BRUSH/SHRUBLAND	SHRUB UPLAND	FOREST, SHRUB
58	FOREST, MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	SHRUB UPLAND	FOREST, SHRUB
59	FOREST, SEVERE BURNED UPLAND VEGETATION	UPLAND FOREST MIX	FOREST

Table 1 continued

	New Jersey's Landscape Project - Andersen (1976) Level 3 LULC Categories	CFA Mapping Habitat Characterization Categories	Species Profile Habitat Categories
60	WATER, STREAMS AND CANALS	WATER	COLD WATER STREAM, WARM WATER STREAM
61	WATER, EXPOSED FLATS	WATER	TIDAL FLAT
62	WATER, NATURAL LAKES	WATER	COLD WATER STREAM, WARM WATER STREAM
63	WATER, ARTIFICIAL LAKES	WATER	COLD WATER STREAM, WARM WATER STREAM
64	WATER, TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	TIDAL WATER	WARM WATER STREAM, MARINE NEAR SHORE ZONE
65	WATER, OPEN TIDAL BAYS	TIDAL WATER	MARINE NEAR SHORE ZONE
66	WATER, TIDAL MUDFLAT	WETCOAST	TIDAL FLAT
67	WATER, DREDGED LAGOON	TIDAL WATER	MARINE NEAR SHORE ZONE
68	WATER, ATLANTIC OCEAN	TIDAL WATER	MARINE NEAR SHORE ZONE, MARINE OFF SHORE ZONE
69	WETLANDS, SALINE MARSHES	WETCOAST	WETLANDS
70	WETLANDS, SALINE MARSHES (LOW MARSH)	WETCOAST	WETLANDS
71	WETLANDS, SALINE MARSHES (HIGH MARSH)	WETCOAST	WETLANDS
72	WETLANDS, FRESHWATER TIDAL MARSHES	WETCOAST	WETLANDS
73	WETLANDS, VEGETATED DUNE COMMUNITIES	BEACH-DUNE	BEACH AND DUNE
74	WETLANDS, PHRAGMITES DOMINATE COASTAL WETLANDS	WETCOAST	WETLANDS
75	WETLANDS, DECIDUOUS WOODED WETLANDS	WETLAND FOREST DEC	WETLANDS, FOREST
76	WETLANDS, CONIFEROUS WOODED WETLANDS	WETLAND FOREST CON	WETLANDS, FOREST
77	WETLANDS, ATLANTIC WHITE CEDAR SWAMP	WETLAND FOREST CON	WETLANDS, FOREST
78	WETLANDS, DECIDUOUS SCRUB/SHRUB WETLANDS	SHRUB WETLAND	WETLANDS, SHRUB
79	WETLANDS, CONIFEROUS SCRUB/SHRUB WETLANDS	SHRUB WETLAND	WETLANDS, SHRUB

Table 1 continued

	New Jersey's Landscape Project - Andersen (1976) Level 3 LULC Categories	CFA Mapping Habitat Characterization Categories	Species Profile Habitat Categories
80	WETLANDS, MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	SHRUB WETLAND	WETLANDS, SHRUB
81	WETLANDS, MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	SHRUB WETLAND	WETLANDS, SHRUB
82	WETLANDS, HERBACEOUS WETLANDS	WETEMERG	WETLANDS
83	WETLANDS, PHRAGMITES DOMINATE INTERIOR WETLANDS	WETEMERG	WETLANDS
84	WETLANDS, MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	WETLAND FOREST MIX	WETLANDS, FOREST
85	WETLANDS, MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	WETLAND FOREST MIX	WETLANDS, FOREST
86	WETLANDS, UNVEGETATED FLATS	WETEMERG	TIDAL FLAT
87	WETLANDS, SEVERE BURNED WETLANDS	WETDIST	WETLANDS
88	BARREN LAND, BEACHES	BEACH-DUNE	BEACH AND DUNE
89	BARREN LAND, BARE EXPOSED ROCK, ROCK SLIDES, ETC.	BARREN	BARREN AND EXPOSED ROCK
90	BARREN LAND, EXTRACTIVE MINING	BARREN	BARREN AND EXPOSED ROCK
91	BARREN LAND, ALTERED LANDS	BARREN	(n/a)
92	WETLANDS, DISTURBED WETLANDS (MODIFIED)	WETDIST	WETLANDS
93	WETLANDS, DISTURBED TIDAL WETLANDS	WETDIST	WETLANDS
94	BARREN LAND, TRANSITIONAL AREAS	BARREN	(n/a)
95	BARREN LAND, UNDIFFERENTIATED BARREN LANDS	BARREN	BARREN AND EXPOSED ROCK
96	WETLANDS, MANAGED WETLANDS (MODIFIED)	WETDIST	WETLANDS

Table 2. Comparative association between the DEP's land use/land cover data and the Northeast Terrestrial Wildlife Habitat Classification System.

In progress: The DFW is working with the State's Natural Heritage Program to complete a comparative association between the DEP's land use/land cover data and the Northeast Terrestrial Wildlife Habitat Classification System. As described above, the DFW recognizes the benefit of such a crosswalk for multi-state and regional conservation efforts. This crosswalk is under development and will be incorporated into the Plan once it is completed.

Appendix G: Conservation Focal Areas' Habitat Types

Conservation Focal Areas' Habitat Types

The following tables list the general habitat types, their acreages, and the percentage of each found within each of the Conservation Focal Areas.

Atlantic Coast Landscape Region

Sandy Hook CFA

Habitat Categories:	Beach-Dune	Coniferous Upland Forest	Shrub Upland	Urban Habitat	Coastal Wetland	Deciduous Upland Forest	Shrub Wetland	Emergent Wetland	Deciduous Wetland Forest	Upland Forest Mixture	Water	Coniferous Wetland Forest	Barren
% of CFA	54.00	20.01	7.07	6.34	3.82	2.63	1.98	1.33	1.06	0.58	0.57	0.48	0.11
Ha of CFA	327	121	43	38	23	16	12	8	6	4	3	3	1

Greater Barnegat Bay CFA

Habitat Categories:	Tidal Water	Coastal Wetland	Deciduous Wetland Forest	Wetland Forest Mixture	Beach-Dune	Shrub Wetland	Coniferous Wetland Forest	Upland Forest Mixture	Shrub Upland	Urban Habitat	Coniferous Upland Forest	Emergent Wetland	Deciduous Upland Forest	Grassland	Water	Disturbed Wetland	Non-Habitat	Barren
% of CFA	43.27	34.82	6.00	5.73	2.72	2.16	1.67	0.76	0.70	0.53	0.51	0.39	0.36	0.18	0.12	0.04	0.03	0.02
Ha of CFA	7,833	6,303	1,087	1,038	492	391	302	138	127	97	92	70	64	32	22	7	5	4

Great Bay Region CFA

Habitat Categories:	Coastal Wetland	Tidal Water	Wetland Forest Mixture	Beach-Dune	Upland Forest Mixture	Shrub Wetland	Deciduous Wetland Forest	Wetland Forest Mixture	Deciduous Upland Forest	Coniferous Upland Forest	Urban Habitat	Emergent Wetland	Shrub Upland	Water	Disturbed Wetland	Grassland	Non-Habitat	Barren
% of CFA	65.70	23.54	2.30	1.74	1.68	0.82	0.73	0.69	0.66	0.53	0.45	0.39	0.38	0.14	0.11	0.06	0.04	0.01
Ha of CFA	12,617	4,520	442	334	323	158	140	132	126	102	87	76	73	27	22	12	8	3

(Atlantic Coast Landscape Region continued)

Greater Atlantic City Coastal Bays CFA

Habitat Categories:	Coastal Wetland	Tidal Water	Beach-Dune	Emergent Wetland	Urban Habitat	Shrub Upland	Shrub Wetland	Non-Habitat	Water
% of CFA	77.27	20.26	1.25	0.36	0.35	0.18	0.16	0.15	0.01
Ha of CFA	1,820	477	30	8	8	4	4	4	0

Cape May Peninsula CFA

Habitat Categories:	Coastal Wetland	Tidal Water	Beach-Dune	Shrub Wetland	Emergent Wetland	Wetland Forest Mixture	Urban Habitat	Upland Forest Mixture	Shrub Upland	Coniferous Upland Forest	Coniferous Wetland Forest	Water	Disturbed Wetland	Wetland Forest Mixture	Deciduous Upland Forest	Non-Habitat	Grassland	Barren
% of CFA	70.12	21.61	3.00	1.40	0.76	0.72	0.39	0.37	0.32	0.31	0.22	0.20	0.17	0.16	0.10	0.08	0.05	0.03
Ha of CFA	9,028	2,782	386	180	97	92	51	47	42	40	28	25	22	21	13	10	7	3

Shark and Navesink Rivers Watershed (Atlantic Coast) CFA

Habitat Categories:	Deciduous Upland Forest	Tidal Water	Urban Habitat	Deciduous Wetland Forest	Coastal Wetland	Upland Forest Mixture	Shrub Upland	Non-Habitat	Grassland	Water	Shrub Wetland	Beach-Dune
% of CFA	63.53	22.87	3.95	3.20	1.92	1.73	1.59	0.60	0.41	0.17	0.02	0.01
Ha of CFA	297	107	18	15	9	8	7	3	2	1	0	0

Delaware Bay Landscape Region

Cape May Peninsula Mosaic CFA

Habitat Categories:	Wetland Forest Mixture	Coastal Wetland	Upland Forest Mixture	Deciduous Wetland Forest	Coniferous Wetland Forest	Shrub Wetland	Coniferous Upland Forest	Deciduous Upland Forest	Emergent Wetland	Water	Shrub Upland	Tidal Water	Grassland	Urban Habitat	Beach-Dune	Disturbed Wetland	Barren	Non-Habitat
% of CFA	32.28	14.57	13.47	9.57	9.15	5.50	3.73	3.16	2.36	1.52	1.50	1.22	0.78	0.43	0.41	0.19	0.14	0.02
Ha of CFA	3,355	1,514	1,400	994	951	572	388	328	245	158	156	127	81	45	43	19	15	2

Delaware Bayshore Marshes CFA

Habitat Categories:	Coastal Wetland	Tidal Water	Emergent Wetland	Wetland Forest Mixture	Deciduous Wetland Forest	Shrub Wetland	Grassland	Coniferous Wetland Forest	Shrub Upland	Beach-Dune	Deciduous Upland Forest	Disturbed Wetland	Water	Upland Forest Mixture	Coniferous Upland Forest	Urban Habitat	Non-Habitat	Barren
% of CFA	72.44	11.12	3.69	2.80	1.77	1.66	1.48	1.44	0.59	0.55	0.52	0.50	0.46	0.45	0.28	0.23	0.01	0.01
Ha of CFA	21,925	3,367	1,117	849	537	503	449	434	178	166	156	151	138	136	85	70	3	3

Delaware Bayshore Forests CFA

Habitat Categories:	Upland Forest Mixture	Wetland Forest Mixture	Coniferous Upland Forest	Deciduous Upland Forest	Deciduous Wetland Forest	Coniferous Wetland Forest	Water	Shrub Upland	Shrub Wetland	Coastal Wetland	Grassland	Emergent Wetland	Urban Habitat	Tidal Water	Barren	Disturbed Wetland	Non-Habitat	Beach-Dune
% of CFA	33.72	21.21	13.07	6.88	6.54	6.31	3.70	2.94	2.29	1.06	0.86	0.78	0.31	0.18	0.07	0.05	0.02	0.01
Ha of CFA	5,727	3,602	2,220	1,169	1,112	1,071	629	500	389	180	147	133	53	31	11	8	3	1

(Delaware Bay Landscape Region continued)

Lower Great Egg Harbor Watershed CFA

Habitat Categories:	Upland Forest Mixture	Coastal Wetland	Wetland Forest Mixture	Deciduous Upland Forest	Tidal Water	Coniferous Upland Forest	Coniferous Wetland Forest	Deciduous Wetland Forest	Shrub Upland	Shrub Wetland	Water	Grassland	Urban Habitat	Emergent Wetland	Disturbed Wetland	Non-Habitat	Barren	Beach-Dune
% of CFA	24.81	21.71	12.78	10.54	6.45	5.98	5.56	4.71	2.96	1.89	1.09	0.81	0.31	0.26	0.09	0.02	0.01	0.00
Ha of CFA	7,247	6,341	3,733	3,080	1,884	1,747	1,625	1,377	865	552	319	238	92	76	27	5	2	1

Lower Maurice River Watershed CFA

Habitat Categories:	Upland Forest Mixture	Coniferous Upland Forest	Deciduous Upland Forest	Coastal Wetland	Wetland Forest Mixture	Deciduous Wetland Forest	Tidal Water	Shrub Upland	Coniferous Wetland Forest	Water	Shrub Wetland	Grassland	Urban Habitat	Emergent Wetland	Barren	Disturbed Wetland	Non-Habitat	Beach-Dune
% of CFA	27.73	12.41	10.32	10.31	9.99	9.05	4.96	4.14	3.88	3.52	1.69	0.80	0.50	0.27	0.21	0.13	0.06	0.01
Ha of CFA	6,309	2,824	2,349	2,345	2,272	2,060	1,129	941	884	802	384	181	114	61	48	30	14	3

Lower Cohansey River Watershed CFA

Habitat Categories:	Coastal Wetland	Tidal Water	Deciduous Upland Forest	Deciduous Wetland Forest	Upland Forest Mixture	Wetland Forest Mixture	Emergent Wetland	Shrub Upland	Grassland	Shrub Wetland	Coniferous Upland Forest	Water	Coniferous Wetland Forest	Urban Habitat	Beach-Dune	Non-Habitat	Disturbed Wetland	Barren
% of CFA	46.56	9.17	7.60	6.66	5.96	5.74	3.44	3.32	3.05	2.74	1.85	1.68	1.46	0.36	0.29	0.10	0.02	0.01
Ha of CFA	2,662	524	434	381	340	328	197	190	174	157	106	96	83	20	17	6	1	0

Piedmont and Inner Coastal Plain Landscape Region

Arthur Kill Watershed CFA

Habitat Categories:	Deciduous Upland Forest	Deciduous Wetland Forest	Tidal Water	Coastal Wetland	Urban Habitat	Water	Shrub Upland	Emergent Wetland	Shrub Wetland	Non-Habitat	Upland Forest Mixture	Disturbed Wetland	Barren	Coniferous Upland Forest	Grassland
% of CFA	32.43	20.80	18.83	9.32	5.32	3.59	3.48	2.53	0.93	0.83	0.53	0.52	0.48	0.31	0.06
Ha of CFA	561	360	326	161	92	62	60	44	16	14	9	9	8	5	1

Naval Weapons Station Earle CFA

Habitat Categories:	Wetland Forest Mixture	Deciduous Upland Forest	Deciduous Wetland Forest	Upland Forest Mixture	Coniferous Upland Forest	Coniferous Wetland Forest	Shrub Upland	Shrub Wetland	Water	Coastal Wetland	Non-Habitat	Urban Habitat	Emergent Wetland	Disturbed Wetland	Tidal Water	Barren	Beach-Dune	Grassland
% of CFA	26.59	26.35	18.38	10.45	9.75	3.19	2.08	1.22	0.55	0.50	0.42	0.38	0.04	0.03	0.02	0.02	0.02	0.01
Ha of CFA	917	909	633	360	336	110	72	42	19	17	15	13	1	1	1	1	1	0

Lower Hudson River CFA

Habitat Categories:	Tidal Water	Urban Habitat	Shrub Upland	Coastal Wetland	Barren	Non-Habitat	Beach-Dune	Water	Deciduous Upland Forest	Emergent Wetland
% of CFA	97.89	1.22	0.26	0.23	0.23	0.13	0.02	0.01	0.01	0.01
Ha of CFA	5,164	64	14	12	12	7	1	0	0	0

(Piedmont and Inner Coastal Plain Landscape Region continued)

Lower Inner Coastal Plain Delaware River CFA

Habitat Categories:	Grassland	Tidal Water	Deciduous Wetland Forest	Deciduous Upland Forest	Coastal Wetland	Shrub Upland	Upland Forest Mixture	Emergent Wetland	Shrub Wetland	Water	Wetland Forest Mixture	Urban Habitat	Barren	Disturbed Wetland	Coniferous Upland Forest	Coniferous Wetland Forest	Non-Habitat	Beach-Dune
% of CFA	27.28	21.64	12.02	9.77	7.46	3.81	3.78	3.64	2.37	2.07	1.90	1.19	0.94	0.84	0.72	0.24	0.17	0.15
Ha of CFA	15,433	12,241	6,802	5,527	4,222	2,158	2,138	2,056	1,342	1,169	1,075	676	533	474	407	135	98	85

Lower Raritan Watershed CFA

Habitat Categories:	Deciduous Wetland Forest	Deciduous Upland Forest	Coastal Wetland	Grassland	Tidal Water	Water	Shrub Upland	Shrub Wetland	Urban Habitat	Upland Forest Mixture	Wetland Forest Mixture	Coniferous Upland Forest	Emergent Wetland	Barren	Disturbed Wetland	Coniferous Wetland Forest	Non-Habitat	Beach-Dune
% of CFA	28.82	22.79	8.15	6.70	5.52	4.03	4.00	3.43	3.14	2.73	2.68	2.22	1.95	1.48	0.83	0.79	0.49	0.26
Ha of CFA	6,126	4,844	1,733	1,423	1,174	856	850	730	667	579	569	472	414	315	177	167	105	56

Millstone and South Branch Raritan Rivers CFA

Habitat Categories:	Deciduous Wetland Forest	Grassland	Deciduous Upland Forest	Shrub Upland	Water	Shrub Wetland	Urban Habitat	Upland Forest Mixture	Emergent Wetland	Coniferous Upland Forest	Disturbed Wetland	Barren	Non-Habitat	Wetland Forest Mixture	Coniferous Wetland Forest
% of CFA	29.85	24.79	21.43	7.75	4.14	3.41	2.65	1.85	1.77	0.78	0.69	0.41	0.38	0.06	0.02
Ha of CFA	6,462	5,365	4,639	1,678	896	739	574	400	384	169	150	89	83	13	5

Palisades Cliffs CFA

Habitat Categories:	Deciduous Upland Forest	Deciduous Wetland Forest	Urban Habitat	Barren	Shrub Upland	Water	Non-Habitat	Shrub Wetland	Upland Forest Mixture	Emergent Wetland
% of CFA	86.86	6.07	4.31	1.19	0.53	0.38	0.31	0.21	0.12	0.03
Ha of CFA	1,218	85	60	17	7	5	4	3	2	0

(Piedmont and Inner Coastal Plain Landscape Region continued)

Passaic and Hackensack Rivers CFA

Habitat Categories:	Deciduous Wetland Forest	Tidal Water	Water	Deciduous Upland Forest	Coastal Wetland	Urban Habitat	Emergent Wetland	Barren	Shrub Upland	Shrub Wetland	Upland Forest Mixture	Disturbed Wetland	Non-Habitat	Grassland	Coniferous Upland Forest	Wetland Forest Mixture
% of CFA	18.95	17.86	16.38	14.97	13.10	4.11	3.28	3.14	2.56	1.83	1.01	0.85	0.81	0.57	0.55	0.01
Ha of CFA	1,509	1,423	1,304	1,192	1,043	328	261	250	204	146	81	68	65	45	44	1

Piedmont Delaware River CFA

Habitat Categories:	Grassland	Deciduous Wetland Forest	Deciduous Upland Forest	Water	Shrub Upland	Shrub Wetland	Emergent Wetland	Urban Habitat	Upland Forest Mixture	Non-Habitat	Barren	Tidal Water	Disturbed Wetland	Coniferous Upland Forest	Wetland Forest Mixture
% of CFA	29.11	27.89	15.80	13.66	4.13	3.28	2.20	1.92	0.63	0.51	0.25	0.25	0.23	0.13	0.01
Ha of CFA	2,218	2,125	1,204	1,041	315	250	168	147	48	39	19	19	17	10	1

Shark and Navesink Rivers Watershed CFA

Habitat Categories:	Deciduous Wetland Forest	Deciduous Upland Forest	Grassland	Water	Shrub Wetland	Upland Forest Mixture	Shrub Wetland	Wetland Forest Mixture	Urban Habitat	Barren	Coastal Wetland	Coniferous Upland Forest	Emergent Wetland	Tidal Water	Non-Habitat	Coniferous Wetland Forest	Disturbed Wetland
% of CFA	26.56	25.12	13.06	6.27	5.77	4.19	3.77	3.76	3.05	1.80	1.79	1.49	1.11	0.77	0.56	0.50	0.45
Ha of CFA	1,665	1,575	819	393	362	262	237	236	191	113	112	94	70	48	35	31	28

Sourlands CFA

Habitat Categories:	Deciduous Upland Forest	Grassland	Deciduous Wetland Forest	Shrub Upland	Upland Forest Mixture	Coniferous Upland Forest	Urban Habitat	Shrub Wetland	Water	Emergent Wetland	Non-Habitat	Barren	Wetland Forest Mixture	Disturbed Wetland	Wetland Forest Mixture
% of CFA	43.58	26.16	14.36	7.97	3.31	1.24	0.96	0.91	0.77	0.31	0.18	0.10	0.10	0.05	0.01
Ha of CFA	7,527	4,518	2,480	1,376	571	215	166	158	133	54	31	17	17	8	1

(Piedmont and Inner Coastal Plain Landscape Region continued)

Upper Inner Coastal Plain Delaware River CFA

Habitat Categories:	Grassland	Deciduous Wetland Forest	Deciduous Upland Forest	Tidal Water	Coastal Wetland	Shrub Wetland	Shrub Upland	Water	Emergent Wetland	Urban Habitat	Upland Forest Mixture	Barren	Coniferous Upland Forest	Non-Habitat	Disturbed Wetland	Wetland Forest Mixture	Coniferous Wetland Forest
% of CFA	37.29	19.38	14.84	10.78	3.46	2.81	2.65	1.92	1.71	1.56	1.26	0.90	0.62	0.27	0.25	0.23	0.04
Ha of CFA	11,101	5,769	4,419	3,209	1,031	837	789	571	509	464	374	267	183	82	76	68	11

Upper Maurice River Watershed (Piedmont and Inner Coastal Plain) CFA

Habitat Categories:	Deciduous Wetland Forest	Grassland	Deciduous Upland Forest	Upland Forest Mixture	Wetland Forest Mixture	Water	Coniferous Wetland Forest	Coniferous Upland Forest	Shrub Wetland	Shrub Upland	Urban Habitat	Emergent Wetland	Disturbed Wetland	Barren	Non-Habitat
% of CFA	23.17	18.38	16.40	14.88	12.01	3.10	2.98	2.41	2.31	2.06	0.97	0.54	0.47	0.21	0.11
Ha of CFA	1,333	1,058	944	856	691	178	171	139	133	118	56	31	27	12	6

Pinelands Landscape Region

Northern Pinelands Fringe CFA

Habitat Categories:	Deciduous Wetland Forest	Coniferous Wetland Forest	Wetland Forest Mixture	Upland Forest Mixture	Deciduous Upland Forest	Coniferous Upland Forest	Shrub Wetland	Urban Habitat	Water	Grassland	Shrub Upland	Disturbed Wetland	Emergent Wetland	Barren	Non-Habitat
% of CFA	33.21	16.54	14.58	10.62	9.51	8.97	2.52	1.03	0.81	0.79	0.64	0.35	0.31	0.07	0.05
Ha of CFA	1,346	670	591	430	386	363	102	42	33	32	26	14	13	3	2

(Pinelands Landscape Region continued)

Core Pinelands Area CFA

Habitat Categories:	Coniferous Upland Forest	Coniferous Wetland Forest	Upland Forest Mixture	Wetland Forest Mixture	Wetland Forest Mixture	Shrub Upland	Shrub Wetland	Deciduous Upland Forest	Grassland	Coastal Wetland	Water	Emergent Wetland	Tidal Water	Urban Habitat	Disturbed Wetland	Barren	Non-Habitat
% of CFA	37.86	15.88	14.24	7.92	5.12	4.69	3.63	2.56	2.52	1.82	1.69	0.93	0.73	0.28	0.05	0.04	0.03
Ha of CFA	62,398	26,170	23,469	13,051	8,436	7,734	5,978	4,221	4,151	3,002	2,789	1,528	1,210	454	88	71	47

Federal/Military Facilities CFA

Habitat Categories:	Coniferous Upland Forest	Shrub Upland	Coniferous Wetland Forest	Upland Forest Mixture	Shrub Wetland	Deciduous Wetland Forest	Wetland Forest Mixture	Emergent Wetland	Deciduous Upland Forest	Water	Urban Habitat	Grassland	Disturbed Wetland	Barren	Non-Habitat
% of CFA	48.02	13.68	8.96	6.88	6.16	4.35	4.12	3.12	1.82	1.48	0.83	0.24	0.18	0.15	0.01
Ha of CFA	5,152	1,467	961	738	661	467	442	335	195	159	89	26	20	16	1

Great Egg Harbor Watershed CFA

Habitat Categories:	Upland Forest Mixture	Wetland Forest Mixture	Coniferous Upland Forest	Coniferous Wetland Forest	Deciduous Wetland Forest	Deciduous Upland Forest	Shrub Wetland	Water	Shrub Upland	Emergent Wetland	Grassland	Urban Habitat	Disturbed Wetland	Coastal Wetland	Non-Habitat	Tidal Water	Barren
% of CFA	21.35	15.43	15.25	14.98	14.63	7.78	3.86	2.49	1.99	0.74	0.57	0.49	0.15	0.12	0.07	0.06	0.05
Ha of CFA	4,773	3,449	3,408	3,347	3,270	1,738	862	556	444	165	128	109	34	26	15	13	11

Upper Inner Coastal Plain Delaware River (Pinelands) CFA

Habitat Categories:	Deciduous Wetland Forest	Deciduous Upland Forest	Grassland	Coniferous Upland Forest	Shrub Wetland	Shrub Upland	Non-Habitat	Water	Urban Habitat	Emergent Wetland	Upland Forest Mixture	Disturbed Wetland
% of CFA	50.02	14.79	14.00	6.61	4.98	4.56	1.40	1.13	0.99	0.94	0.45	0.13
Ha of CFA	37	11	10	5	4	3	1	1	1	1	0	0

(Pinelands Landscape Region continued)

Upper Maurice River Watershed (Pinelands) CFA

Habitat Categories:	Deciduous Wetland Forest	Wetland Forest Mixture	Upland Forest Mixture	Coniferous Wetland Forest	Deciduous Upland Forest	Water	Shrub Wetland	Shrub Upland	Coniferous Upland Forest	Urban Habitat	Grassland	Disturbed Wetland	Emergent Wetland	Barren	Beach-Dune	Non-Habitat
% of CFA	42.92	15.81	10.01	8.68	6.42	4.84	3.38	3.30	2.99	0.69	0.43	0.22	0.17	0.08	0.05	0.02
Ha of CFA	652	240	152	132	98	74	51	50	45	10	6	3	3	1	1	0

Skylands Landscape Region

Kittatinny Ridge CFA

Habitat Categories:	Deciduous Upland Forest	Upland Forest Mixture	Coniferous Upland Forest	Water	Shrub Upland	Deciduous Wetland Forest	Grassland	Emergent Wetland	Shrub Wetland	Urban Habitat	Wetland Forest Mixture	Coniferous Wetland Forest	Barren	Non-Habitat	Disturbed Wetland
% of CFA	58.25	15.46	5.32	5.06	4.71	4.68	2.17	1.45	1.29	0.60	0.49	0.30	0.15	0.04	0.00
Ha of CFA	21,231	5,634	1,941	1,845	1,716	1,707	792	530	472	219	178	108	56	16	1

Kittatinny Slope Mosaic CFA

Habitat Categories:	Deciduous Upland Forest	Deciduous Wetland Forest	Upland Forest Mixture	Grassland	Water	Shrub Upland	Emergent Wetland	Coniferous Upland Forest	Shrub Wetland	Urban Habitat	Wetland Forest Mixture	Non-Habitat	Coniferous Wetland Forest	Disturbed Wetland	Barren
% of CFA	56.47	9.50	7.87	7.27	6.27	4.52	2.10	1.89	1.75	1.15	0.92	0.14	0.12	0.03	0.02
Ha of CFA	8,866	1,491	1,236	1,141	984	709	329	297	274	181	144	22	18	4	2

(Skylands Landscape Region continued)

Kittatinny Valley Mosaic CFA

Habitat Categories:	Deciduous Upland Forest	Deciduous Wetland Forest	Grassland	Shrub Upland	Water	Upland Forest Mixture	Emergent Wetland	Shrub Wetland	Coniferous Upland Forest	Urban Habitat	Wetland Forest Mixture	Non-Habitat	Barren	Coniferous Wetland Forest	Disturbed Wetland
% of CFA	44.15	15.50	11.34	6.37	5.53	4.87	4.75	4.68	1.17	0.79	0.39	0.19	0.16	0.07	0.05
Ha of CFA	7,528	2,642	1,933	1,085	943	831	809	798	200	135	66	33	27	12	9

Wallkill Headwaters Wetlands CFA

Habitat Categories:	Deciduous Upland Forest	Deciduous Wetland Forest	Emergent Wetland	Grassland	Upland Forest Mixture	Shrub Upland	Shrub Wetland	Water	Coniferous Upland Forest	Urban Habitat	Wetland Forest Mixture	Non-Habitat	Disturbed Wetland	Barren	Coastal Wetland
% of CFA	35.63	18.95	12.14	10.67	6.47	5.84	5.23	3.28	0.65	0.49	0.30	0.20	0.11	0.03	0.01
Ha of CFA	1,942	1,033	662	581	353	318	285	179	36	27	16	11	6	2	0

Highlands Core CFA

Habitat Categories:	Deciduous Upland Forest	Upland Forest Mixture	Water	Deciduous Wetland Forest	Shrub Upland	Shrub Wetland	Coniferous Upland Forest	Urban Habitat	Wetland Forest Mixture	Emergent Wetland	Grassland	Coniferous Wetland Forest	Non-Habitat	Barren	Disturbed Wetland	Beach-Dune
% of CFA	68.33	8.02	7.33	7.30	1.80	1.72	1.70	1.06	0.74	0.61	0.54	0.50	0.16	0.14	0.03	0.00
Ha of CFA	51,345	6,027	5,511	5,485	1,354	1,296	1,274	797	556	461	408	379	120	109	19	1

Glacial Lake Passaic Wetlands CFA

Habitat Categories:	Deciduous Wetland Forest	Emergent Wetland	Deciduous Upland Forest	Shrub Wetland	Water	Shrub Upland	Urban Habitat	Grassland	Non-Habitat	Barren	Disturbed Wetland	Upland Forest Mixture	Coniferous Upland Forest	Wetland Forest Mixture
% of CFA	56.81	13.54	8.76	8.61	3.55	3.31	2.14	2.04	0.44	0.34	0.28	0.13	0.02	0.01
Ha of CFA	5,485	1,307	846	831	343	319	207	197	43	33	27	13	2	1

(Skylands Landscape Region continued)

Raritan and Passaic River Headwaters CFA

Habitat Categories:	Deciduous Upland Forest	Deciduous Wetland Forest	Grassland	Water	Shrub Upland	Upland Forest Mixture	Urban Habitat	Shrub Wetland	Coniferous Upland Forest	Emergent Wetland	Non-Habitat	Disturbed Wetland	Barren	Wetland Forest Mixture	Beach-Dune	Coniferous Wetland Forest
% of CFA	52.09	16.09	10.50	8.67	5.32	1.67	1.57	1.53	0.99	0.73	0.50	0.17	0.12	0.04	0	0
Ha of CFA	14,164	4,374	2,855	2,359	1,448	455	427	416	268	197	135	46	33	12	1	1

Northern Delaware River Tributaries CFA

Habitat Categories:	Deciduous Upland Forest	Deciduous Wetland Forest	Grassland	Water	Shrub Upland	Upland Forest Mixture	Emergent Wetland	Shrub Wetland	Coniferous Upland Forest	Urban Habitat	Non-Habitat	Barren	Wetland Forest Mixture	Disturbed Wetland	Coniferous Wetland Forest
% of CFA	56.59	13.03	11.51	6.96	4.31	2.43	1.36	1.36	1.02	0.79	0.30	0.13	0.10	0.09	0.04
Ha of CFA	13,647	3,141	2,775	1,678	1,038	585	329	328	245	190	73	30	23	22	8

Hunterdon Plateau Delaware Valley Streams CFA

Habitat Categories:	Deciduous Upland Forest	Water	Grassland	Deciduous Wetland Forest	Shrub Upland	Upland Forest Mixture	Coniferous Upland Forest	Shrub Wetland	Urban Habitat	Emergent Wetland	Non-Habitat	Wetland Forest Mixture	Barren	Coniferous Wetland Forest	Disturbed Wetland	Coastal Wetland
% of CFA	44.61	15.07	12.54	12.19	6.55	4.07	1.55	1.07	1.01	0.57	0.43	0.17	0.07	0.03	0.02	0.02
Ha of CFA	3,405	1,150	957	931	500	310	119	82	77	43	33	13	5	3	2	1

Picatinny Military Installation CFA

Habitat Categories:	Deciduous Upland Forest	Upland Forest Mixture	Water	Shrub Wetland	Deciduous Wetland Forest	Shrub Upland	Coniferous Upland Forest	Wetland Forest Mixture	Emergent Wetland	Urban Habitat	Barren	Non-Habitat	Coniferous Wetland Forest
% of CFA	52.48	16.19	11.48	8.42	6.22	2.22	0.99	0.86	0.36	0.33	0.24	0.19	0.01
Ha of CFA	712	220	156	114	84	30	13	12	5	5	3	3	0

Marine Landscape Region

Raritan Bay/Sandy Hook CFA

Habitat Categories:	Tidal Water
% of CFA	100
Ha of CFA	15,417

Asbury Park CFA

Habitat Categories:	Tidal Water
% of CFA	99.98
Ha of CFA	4,074

Mantoloking CFA

Habitat Categories:	Tidal Water
% of CFA	100
Ha of CFA	888

Barnegat Light CFA

Habitat Categories:	Tidal Water
% of CFA	100
Ha of CFA	6,698

(Marine Landscape Region continued)

Jacques Cousteau CFA

Habitat Categories:	Tidal Water
% of CFA	100
Ha of CFA	7,212

Ocean City CFA

Habitat Categories:	Tidal Water
% of CFA	100
Ha of CFA	1,172

Sea Isle/Stone Harbor CFA

Habitat Categories:	Tidal Water
% of CFA	100
Ha of CFA	7,667

Delaware Bay CFA

Habitat Categories:	Tidal Water
% of CFA	100
Ha of CFA	46,418

This page intentionally left blank

Appendix H: List of Threats and Action Drivers

List of Threats and Action Drivers

Below are the threats and action drivers relative to wildlife and wildlife habitats. They were defined and categorized by the three-level lexicons developed by the International Union for the Conservation of Nature's (IUCN) and the U.S. Fish & Wildlife Service (detailed in Chapter 3), and serve to standardize the categories for threats and action drivers, and, later, conservation actions to address them. In addition, New Jersey chose to develop an even finer fourth level of actions that are specific to New Jersey.

IUCN Threat and TRACS Action Driver Categories			
Level 1	**Level 2**	**Level 3**	**Level 4: NJ-specific Threat and Action Driver Statements**

1 Residential and Commercial Development: *Threats to native habitat and wildlife associated with the conversion of natural land to development for residential, commercial and industrial or other non-agricultural land uses with a substantial footprint.*

1.1 Housing and Urban Areas: *Expansion or development of new residential areas of cities, towns and settlements including non-housing development that is typically integrated with housing.*

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale): *Habitat loss, fragmentation, and degradation (including wildlife travel corridors) associated with habitat conversion to housing and associated infrastructure and traffic.*

1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.1.1.2 Loss, alteration and/or degradation of habitat.

1.1.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.

1.1.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.

1.1.1.5 Impervious surfaces can lead to a decrease in water recharge.

1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.1.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.1.2 Residential development using materials that cause collision hazards: *Residential development that increases collision risk because of height, lighting scaffolding, and/or reflectance or transparency of materials used.*

1.1.2.1 Collision risk to volant species (birds, bats and invertebrates).

1.2 Commercial and Industrial Areas: *Commercial and non-extractive industrial development and operations.*

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale): *Habitat loss, fragmentation, and degradation (including wildlife travel corridors) resulting from habitat conversion to commercial or industrial use and associated infrastructure and traffic (Note: The conversion of natural landscapes to structures and infrastructure within military bases are included within this category).*

1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.2.1.2 Loss, alteration and/or degradation of habitat.

1.2.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.

1.2.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.

1.2.1.5 Impervious surfaces can lead to a decrease in water recharge.

1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

Level 1	Level 2	Level 3	Level 4: NJ-specific Threat and Action Driver Statements

1.2.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.2.2 Commercial development using materials that cause collision hazards: *Commercial and industrial development that increases collision risk because of height, lighting scaffolding, and/or reflectance or transparency of materials used.*

1.2.2.1 Collision risk to volant species (birds, bats and invertebrates).

1.3 Tourism and Recreational Areas: *Tourism and recreation sites with a substantial footprint.*

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale): *Conversion of significant natural habitats (including wildlife travel corridors) into active recreation parks (e. g., ball fields, camping areas, golf courses) (Note: The conversion of natural landscapes to recreational and/or outdoor training areas within military bases are included within this category).*

1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.3.1.2 Loss, alteration and/or degradation of habitat.

1.3.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.

1.3.1.4 Impervious surfaces can lead to a decrease in water recharge.

1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.3.1.6 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

2 Agriculture and Aquaculture: *Threats to native habitat and/or fish/wildlife associated with the conversion of natural habitat to farming, ranching, silviculture, mariculture or aquaculture, including expansion and intensification and/or changes in practices.*

2.1 Annual and Perennial Crops (non-timber): *Planting and harvesting of crops planted for food, fodder, fiber, fuel or other uses.*

2.1.1 Shifting Agriculture: *Changing the agricultural use of a land from one that can be beneficial to animals (e.g., hay fields, pastureland) if managed for target species to one of lesser or no use (e.g., intensive tree/shrub nurseries).*

2.1.1.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.1.2 Conversion, and subsequent loss, of high salt marsh to low salt marsh threatens high-marsh dependent species and those dependent on the marsh-upland ecotone.

2.1.1.3 Conversion of agricultural landscape that results in increased erosion, runoff, and chemical and thermal pollution decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.1.1.4 Salt hay farming on Delaware Bay marshes, and the subsequent conversion of those farms to fully tidal marshes, results in compressed sediments that are less resilient to coastal forces of erosion and sea level rise.

2.1.1.5 Lack of competitive market prices to maintain native grasslands causes conversion to other crops that have more monetary value but less value as wildlife habitat.

2.1.2 Small-holder Farming: *Small-scale and/or family farms, primarily for personal consumption or local markets, that causes habitat loss, degradation and/or fragmentation.*

2.1.2.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.2.2 Fragments terrestrial and aquatic habitats.

Level 1	Level 2	Level 3	Level 4: NJ-specific Threat and Action Driver Statements

2.1.2.3 Agricultural practices (e.g., mechanized, row-crop agriculture) can render lands unsuitable for most wildlife due to soil degradation and erosion.

2.1.2.4 Agricultural practices (e.g., mechanized, row-crop agriculture) can cause direct mortality to wildlife when harvesting takes places.

2.1.2.5 Lack of competitive market prices to maintain native grasslands causes conversion to other crops that have more monetary value but less value as wildlife habitat.

2.1.3 Agro-industry: *Industrial-scale agriculture, including new or expansion of existing facilities that causes habitat loss, degradation and/or fragmentation.*

2.1.3.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.3.2 Fragments terrestrial and aquatic habitats.

2.1.3.3 Agricultural practices (e.g., mechanized, row-crop agriculture) can render lands unsuitable for most wildlife due to soil degradation and erosion.

2.1.3.4 Agricultural practices (e.g., mechanized, row-crop agriculture) can cause direct mortality to wildlife when harvesting takes places.

2.1.3.5 Loss of ecotones by implementing clean farming (edge-to-edge) practices degrades habitat for early successional wildlife.

2.1.3.6 Lack of competitive market prices to maintain native grasslands causes conversion to other crops that have more monetary value but less value as wildlife habitat.

2.2 Wood and Pulp Plantations: *Growing and harvesting trees and other woody vegetation for timber, fiber or fuel.*

2.2.1 Small Holder: *Small-scale wood or pulp plantations and associated facilities or expansion of existing facilities that causes habitat loss, degradation and/or fragmentation.*

2.2.1.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.2.1.2 Tree harvesting can cause direct mortality to wildlife, especially if done during peak activity periods or vulnerable life stages (e.g., denning, nesting, gestation/birthing, basking, roosting, pre-volancy, etc.).

2.2.1.3 Improper design or restoration of skid roads may result in ponded areas that serve as habitat sinks for amphibians.

2.2.2 Agro-industry Plantations: *Industrial-scale wood or pulp plantations and associated facilities or expansion of existing facilities that causes habitat loss, degradation and/or fragmentation.*

2.2.2.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.2.2.2 Tree harvesting can cause direct mortality to wildlife, especially if done during peak activity periods or vulnerable life stages (e.g., denning, nesting, gestation/birthing, basking, roosting, pre-volancy, etc.).

2.2.2.3 Improper design or restoration of skid roads may result in ponded areas that serve as habitat sinks for amphibians.

2.3 Livestock Farming and Ranching: *Raising of animals for human consumption of other human use.*

2.3.2 Small-holder Grazing: *Small-scale and/or family farms, primarily for personal consumption or local markets, that use or converts natural habitat to facilities (including expansion of existing facilities), grazing land or other livestock farming.*

2.3.2.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.2.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

2.3.2.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.2.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

Level 1	Level 2	Level 3	Level 4: NJ-specific Threat and Action Driver Statements

2.3.3 Agro-industry Grazing: *Industrial-scale use or conversion of natural habitat to facilities (including expansion of existing facilities), grazing land or other livestock farming.*

2.3.3.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.3.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

2.3.3.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.3.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

2.4 Marine and Freshwater Aquaculture: *Propagation, rearing, and subsequent harvesting of aquatic organisms in controlled or selected environments, including interventions in the rearing process to increase production such as stocking, feeding, transplanting and providing for protection from predators.*

2.4.1 Subsistence/Artisinal Aquaculture: *Small-scale aquaculture, primarily for personal consumption or local markets, that causes habitat loss or degradation.*

2.4.1.1 May degrade freshwater and intertidal habitat due to farming techniques and damage from associated structures.

2.4.1.2 Increased risk of parasite introduction into marine environments.

2.4.1.3 Potential for increased nutrient and effluent loads.

2.4.1.4 Potential increased noise pollution.

2.4.1.5 Increased risk of persistent human disturbance from tending activities that hinder or preclude habitat use by SGCN.

2.4.1.6 Potential for aquaculture structures to create impingement/entanglement hazard and/or preclude benthic habitat use by SGCN.

2.4.1.7 Potential for fish to escape and compete with, predate upon, interbreed with, or spread disease to SGCN fish species.

2.4.2 Industrial Aquaculture: *Large-scale aquaculture, primarily for wholesale, that causes habitat loss or degradation.*

2.4.2.1 May degrade freshwater and intertidal habitat due to farming techniques and damage from associated structures.

2.4.2.2 Increased risk of parasite introduction into marine environments.

2.4.2.3 Potential for increased nutrient and effluent loads.

2.4.2.4 Potential increased noise pollution.

2.4.2.5 Increased risk of persistent human disturbance from tending activities that hinder or preclude habitat use by SGCN.

2.4.2.6 Potential for aquaculture structures to create impingement/entanglement hazard and/or preclude benthic habitat use by SGCN.

2.4.2.7 Potential for fish to escape and compete with, predate upon, interbreed with, or spread disease to SGCN fish species.

2.4.2.8 Potential for fish to escape and compete with, predate upon, or spread disease to fish species that serve as hosts for SGCN freshwater mussels.

Level 1	Level 2	Level 3	Level 4: NJ-specific Threat and Action Driver Statements

3 Energy Production and Mining: *Threats to native habitat and/or fish/wildlife associated with exploring for, developing, producing and distributing energy or geological resources.*

3.1 Oil and Gas Facilities and Pipelines: *Distribution of oil and natural gas.*

3.1.1 Distribution processes of petroleum and other liquid hydrocarbons: *Placement of new facilities and pipelines or expansion of existing facilities and pipeline to develop, produce and/or distribute petroleum and other liquid hydrocarbons that causes habitat loss, degradation, and/or fragmentation.*

3.1.1.1 Fragments terrestrial and aquatic habitats.

3.1.1.2 Loss, alteration and/or degradation of habitat.

3.1.1.3 Increased risk of oil spills.

3.1.1.4 Increased noise pollution.

3.1.1.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.

3.1.1.6 Increased risk of collision between marine mammals, sea turtles and fish and the marine-based structures/facilities.

3.1.2 Natural gas distribution processes: *Placement of new facilities and pipelines or expansion of existing facilities and pipelines to develop, produce and/or distribute natural gas that causes habitat loss, degradation, and/or fragmentation.*

3.1.2.1 Fragments terrestrial and aquatic habitats.

3.1.2.2 Loss, alteration and/or degradation of habitat.

3.1.2.3 Increased risk of gas leaks and explosions.

3.1.2.4 Increased noise pollution.

3.1.2.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.

3.1.2.6 Increased risk of collision between marine mammals, sea turtles and fish and the marine-based structures/facilities.

3.2 Mining and Quarrying: *Exploring for, developing, producing and distributing minerals and rocks.*

3.2.2 Surface Mining - Rock Quarry (and sand quarries): *Placement of new facilities or expansion of existing facilities to develop, produce and/or distribute quarry products that causes habitat loss, degradation, and/or fragmentation.*

3.2.2.1 Fragments terrestrial and aquatic habitats.

3.2.2.2 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

3.2.2.3 Increased risk of vehicle strikes/mortality to wildlife.

3.2.4 Sand Dredging (outside shipping lanes): *Dredging offshore sand (for placement on Atlantic coastal beaches) from sensitive areas that alters and/or degrades the natural, benthic habitat(s).*

3.2.4.1 Loss, alteration and/or degradation of benthic marine habitats.

3.2.4.2 Increased noise pollution.

Level 1	Level 2	Level 3	Level 4: NJ-specific Threat and Action Driver Statements

3.2.4.3 Potential for direct mortality of benthic organisms.

3.3 Renewable Energy: *Exploring, developing, producing and distributing renewable energy.*

3.3.1 Wind Power: *Placement of new facilities or expansion of existing facilities that causes habitat loss, degradation, and/or fragmentation and/or that leads to increased bird and bat fatalities within their movement corridors and foraging areas.*

3.3.1.1 Turbines, blades, and structure foundations create a collision risk to volant species (birds, bats and invertebrates) and marine animals.

3.3.1.2 Fragments terrestrial habitats.

3.3.1.3 Loss, alteration and/or degradation of habitat.

3.3.1.4 Increased commercial infrastructure.

3.3.2 Solar Power: *Placement of new facilities or expansion of existing facilities that causes habitat loss, degradation, and/or fragmentation.*

3.3.2.1 Fragments terrestrial habitats.

3.3.2.2 Loss, alteration and/or degradation of habitat.

3.3.2.3 Increased commercial infrastructure.

3.4 Conventional Power Plants: *Placement of new facilities or expansion of existing facilities that causes impacts to groundwater hydrology and/or alters the water temperature and/or pH of aquatic systems.*

3.4.0 Conventional Power Plants: *Placement of new facilities or expansion of existing facilities that causes impacts to groundwater hydrology and/or alters the water temperature and/or pH of aquatic systems.*

3.4.0.1 Methane flares cause injuries and mortality to birds perching on stacks.

3.4.0.2 Loss, alteration and/or degradation of habitat due to new or the expansion of current facilities.

3.4.0.3 Alteration of the temperature, pH and/or hydrology of aquatic ecosystems change plant communities and can harm wildlife and/or impact their behavior and survivorship.

4 Transportation and Service Corridors: *Threats to native habitat and/or fish/wildlife associated with long, narrow transportation corridors outside of human settlements and industrial developments and the vehicles that use them that causes habitat loss, degradation and fragmentation, wildlife mortality, species isolation and more.*

4.1 Roads and Railroads: *Non-energy related transportation corridors on land.*

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale): *Placement of new roads that result in the degradation of habitat including pathways for invasive species, the fragmentation of habitat resulting in the loss of interior conditions for forest interior dwelling species, increased access by predators and parasites resulting in reduced breeding success, and increased access for people resulting in future development activities, and the implementation of physical barriers (e.g., residential curbs, "NJ Barriers") that disrupt wildlife movement corridors.*

4.1.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species and inhibiting dispersal of non-volant animals, reducing gene flow.

4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.1.1.3 Re-establishment of abandoned railroad lines may displace wildlife, in particular, less mobile species using the area to fulfill critical life history requirements.

4.1.1.4 Re-establishment of abandoned railroad lines may increase the risk of direct mortality on wildlife.

Level 1	Level 2	Level 3	Level 4: NJ-specific Threat and Action Driver Statements

4.1.1.5 Re-establishment of abandoned railroad lines may decrease turtles' abilities to disperse due to their difficulty traversing the railroad ties and tracks, leading to decreased genetic exchange.

4.1.2 Movement of cars and other vehicles on roads and railroads (large and small scale): *Vehicular traffic densities that increase wildlife mortality and disrupt movement corridors.*

4.1.2.1 Increased vehicle traffic increases the risk of wildlife mortality from strikes.

4.2 Utility and Service Lines: *Distribution of energy & resources.*

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads: *Placement of new service lines and communication towers, their facilities and associated access roads that result in the degradation of habitat including pathways for invasive species, the fragmentation of habitat resulting in the disruption of movement corridors and/or loss of interior conditions for forest interior dwelling species, wildlife mortality through strikes or other contact with associated equipment (e.g., electrical lines, towers),increased access by predators and parasites resulting in reduced breeding success, and increased access for people resulting in future development activities.*

4.2.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species, inhibiting dispersal of non-volant animals, reducing gene flow, and creating barriers to fish when service line-associated roads cross streams (e.g., bridges, culverts, fords, etc.).

4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

4.2.1.3 Powerline structures attract perching raptors, increasing the risk of raptor electrocution.

4.2.1.4 Lines that cross or run parallel to streams result in a loss or reduction of vegetated riparian buffers and streamside shading, affecting water quality and in-stream habitat for aquatic biota.

4.2.1.5 Tall radio and utility towers with guy lines pose a strike hazard for migrant bats and birds, especially in poor visibility conditions (e.g., fog, nighttime, poor weather conditions).

4.2.2 Management of rights-of-way or communication tower facilities and/or their associated access roads: *Managing the vegetation within and adjacent to the rights-of-way, communication tower facilities and/or their associated access roads in a manner that results in direct mortality of wildlife (e.g., mowing during ground-nesting birds' or reptiles nesting season) or the creation of unsuitable habitat or conditions (e.g., herbiciding important food plants for invertebrates).*

4.2.2.1 Improper or poorly scheduled vegetation management can cause direct mortality to and may reduce productivity of wildlife.

4.3 Shipping Lanes: *Transportation on and in freshwater and ocean waterways.*

4.3.1 Movement of large ships in shipping lanes: *Ship traffic densities that increase marine and freshwater species' mortality and/or disrupt movement corridors or migratory patterns.*

4.3.1.1 Increased ship traffic increases the risk of wildlife mortality from strikes.

4.3.1.2 May disturb nesting and foraging of shoreline birds and aquatic animals, and/or alter migratory patterns of aquatic and marine wildlife.

4.3.2 Dredging impacts: *Removal, transportation and placement of dredged material in containment facilities that causes the alteration of natural habitats, and/or the direct mortality of wildlife.*

4.3.2.1 Threatens wildlife by disrupting/removing stream bottom habitat.

4.3.2.2 Historic and current reuse of containment facilities over time may disrupt/displace nesting birds.

4.3.2.3 Transportation of materials to and from disposal facilities may pose temporary disturbance to wildlife impacting foraging and nesting success.

Level 1	Level 2	Level 3	Level 4: NJ-specific Threat and Action Driver Statements

4.4 Flight Paths: *Transportation in air and space.*

4.4.1 Airplane flight paths: *Flight travel paths (for large and small aircraft) that conflict with and thereby increased fatalities of birds, bats and invertebrates, especially during migration, within migration corridors and concentration areas, and important foraging grounds.*

4.4.1.1 Increased noise disturbance to wildlife, disrupting their normal behaviors.

4.4.1.2 Increased risk of collision between airplanes and birds, bats and insects.

5 Biological Resource Use: *Threats to native habitat and/or fish/wildlife associated with overharvesting biological resources for commercial, recreation, subsistence, research or cultural purposes, including both deliberate and unintentional harvesting beyond sustainable levels, and actions of persecution or control of undesirable wildlife or plants.*

5.1 Hunting and Collecting Terrestrial Animals: *Overharvesting terrestrial wild animals or animal products; includes accidental mortality/bycatch.*

5.1.1 Intentional Use: *Excessive or illegal collection of butterflies and other insects, the illegal collection of reptiles and amphibians and localized excessive beaver trapping.*

5.1.1.1 Illegal collection of wildlife can have detrimental impacts on populations.

5.1.1.2 Legal but excessive harvest of SGCN game species.

5.1.2 Unintentional effects: *Includes unintended impacts to non-target species such as, but not limited to, the bycatch of marsh birds in muskrat traps or the introduction of lead (ammunition) into the environment and in dead animals later scavenged.*

5.1.2.1 Lead in ammunition is consumed by wildlife in the course of foraging and scavenging causing injury and death.

5.1.2.2 Disruption of normal wildlife behavior.

5.1.3 Persecution/Control: *Harming, killing or controlling the presence of species considered undesirable (e.g., snakes, bats, invertebrates) and similar-looking species (i.e., those species misidentified as an undesirable species).*

5.1.3.1 Wanton killing of perceived dangerous and/or undesirable animals.

5.1.3.2 Improper exclusion methods and/or timing can result in injury, death, or entrapment of bats in buildings.

5.2 Gathering Terrestrial Plants: *Overharvesting plants, fungi (mushrooms) and other non-timber/non-animal species.*

5.2.2 Unintentional effects: *Includes unintended impacts to non-target species through the trampling or other means of destruction of plants, fungi and/or ecological communities.*

5.2.2.1 Stepping on nests or young/hatchling animals.

5.2.3 Control: *Harming, killing or controlling the presence of plants and/or ecological communities considered undesirable (e.g., doesn't meet humans' aesthetic desires or is a native, invasive plant that is taking over a local landscape).*

5.2.3.1 Alteration or control of undesirable plants or plant communities can destroy important food and nectar plants for native insects and animals.

5.2.3.2 Clearing of scrub-shrub vegetation [and snags] diminishes cover and nesting habitat.

5.2.3.3 Removal of riparian or near-stream vegetation alters water quality and in-stream habitat for aquatic organisms by reducing streamside shading, increasing bank erosion, and affecting the natural filtering ability of trees, shrubs, and grasses.

Level 1	Level 2	Level 3	Level 4: NJ-specific Threat and Action Driver Statements

5.3 Logging and Wood Harvesting: *Harvesting trees and other woody vegetation for timber, fibre, or fuel.*

5.3.1 Intentional Use (subsistence/small scale): *Harvesting trees and other woody vegetation from natural landscapes on public or private lands at a small-scale primarily for personal use or local markets, leading to the loss, fragmentation, degradation, and/or isolation of forested habitats and species. For the purposes of NJ's SWAP, small scale is defined as meeting the Forest Stewardship Council's "Small and Low Intensity Managed Forest" (SLIMF).*

5.3.1.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.1.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.1.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.1.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.1.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.1.6 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices in Atlantic White Cedar stands may destroy a unique wildlife wetland habitat that is difficult, and takes time, to restore.

5.3.2 Intentional Use (large scale): *Harvesting trees and other woody vegetation from natural landscapes on public or private lands on a large-scale for commercial markets, leading to loss, fragmentation, degradation, and isolation of forested habitats and species. For the purposes of NJ's SWAP, large scale is defined as forest harvest exceeding the Forest Stewardship Council's "Small and Low Intensity Managed Forest" (SLIMF).*

5.3.2.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.2.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.2.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.2.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.2.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.2.6 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices in Atlantic White Cedar stands may destroy a unique wildlife wetland habitat that is difficult, and takes time, to restore.

5.3.3 Unintentional effects (subsistence/small scale): *Includes unintended impacts to wildlife and/or their critical habitats as a result of small-scale/subsistence forestry practices. For the purposes of NJ's SWAP, small scale is defined as meeting the Forest Stewardship Council's "Small and Low Intensity Managed Forest" (SLIMF).*

5.3.3.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.3.2 Poorly planned/implemented tree harvesting adjacent to waterways and vernal pools can lead to increased water temperatures, soil erosion and sedimentation, and reduces the potential for woody debris within the aquatic system, leading to negative impacts on wildlife.

Level 1	Level 2	Level 3	Level 4: NJ-specific Threat and Action Driver Statements

5.3.4 Unintentional effects (large scale): *Includes unintended impacts to wildlife and/or their critical habitats as a result of commercial-scale forestry practices but also includes impacts to wildlife and/or their critical habitats as a result of a lack of forest management which may result in conditions of overstocked stands, excessive understory or stagnation at a particular forest stand condition. For the purposes of NJ's SWAP, large scale is defined as forest harvest exceeding the Forest Stewardship Council's "Small and Low Intensity Managed Forest" (SLIMF).*

5.3.4.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4.2 Extensive infrastructure and larger equipment requirements present a potential risk of direct injury/mortality to wildlife.

5.3.4.3 Poorly planned/implemented tree harvesting adjacent to waterways and vernal pools can lead to increased water temperatures, soil erosion and sedimentation, and reduces the potential for woody debris within the aquatic system, leading to negative impacts on wildlife.

5.3.4.4 Infrastructure and/or equipment use may result in subtle changes to drainage patterns, adversely affecting vernal pool and wetland hydrology.

5.3.4.5 Lack of appropriate, sustainable forest management can lead to a decrease in forest habitat diversity, degraded habitat for many forest species, the loss of habitat for early-successional species, and/or the loss of unique habitats for species that need canopy breaks and multi-aged tree composition to fulfill various life history requirements.

5.4 Fishing and Harvesting of Aquatic Resources: *Harvesting aquatic wild animals or plants for commercial, recreation, subsistence, research, or cultural purposes including both deliberate and unintentional harvesting, and actions of persecution or control of undesirable animals or plants.*

5.4.1 Intentional Use (subsistence/small scale): *Excessive harvest of aquatic animals or plants from public or private "lands" (i.e., aquatic systems) at a small-scale primarily for personal use or local markets that leads to the loss or degradation of aquatic habitats and/or decline of aquatic species.*

5.4.1.1 Legal but excessive harvest of SGCN and/or sensitive game species can threaten populations especially for species already suffering from multiple threats.

5.4.1.2 Overharvesting of one species may lead to detrimental impacts on another; e.g., the harvesting of horseshoe crabs reduces the food availability for migrating shorebirds dependent on crab eggs.

5.4.1.3 Collection of fish for food, bait, or aquarium trade can lead to population exploitation.

5.4.1.4 Illegal collection of aquatic and semi-aquatic wildlife can have detrimental impacts on populations.

5.4.2 Intentional Use (large scale): *Excessive harvest of aquatic animals or plants from public or private "lands" (i.e., aquatic systems) at a large-scale for commercial markets that leads to the loss or degradation of aquatic habitats and/or decline of aquatic species (e.g., excessive horseshoe crab harvest).*

5.4.2.1 Overharvesting of one species may lead to detrimental impacts on another; e.g., overharvest of menhaden affecting piscivorous birds.

5.4.2.2 Collection of fish for food, bait, or aquarium trade can lead to population exploitation.

5.4.2.3 Legal but excessive harvest of commercial SGCN species can threaten populations.

5.4.2.4 Illegal collection of aquatic and semi-aquatic wildlife can have detrimental impacts on populations.

5.4.3 Unintentional effects (subsistence/small scale): *Includes unintended impacts to aquatic animals and/or vegetation as a result of small-scale/subsistence fishing/harvesting practices (e.g., diamond-backed terrapin by-catch within crab traps without excluder devices), the introduction of fishing-gear (e.g., line and hooks) into aquatic systems in which animals become entangled, injured or killed, the disruption of substrate/benthic habitat during trawling activities conducted as a result of product harvesting and/or scientific research.*

5.4.3.1 Abandoned fishing tackle and gear, crab pots without excluders and ghost crab pots increase the risk of injury and death to marine mammals, sea turtles, sea birds, pinnipeds and fish species as well as terrestrial and semi-aquatic species as a result of consuming tackle or gear, entrapment and entanglement in gear.

Level 1	Level 2	Level 3	Level 4: NJ-specific Threat and Action Driver Statements

5.4.3.2 Commercial/recreational shellfish dredging may impact marine ecosystems by uprooting submerged aquatic vegetation, disrupting substrates, increasing turbidity, and increasing predator species in localized areas.

5.4.3.3 Heavy fishing pressure in localized areas can prevent foraging birds from hunting prime areas decreasing their likelihood of success and reproduction.

5.4.3.4 Fish introduced for sport fishing can negatively impact native species by competing for resources and/or altering the habitat (e.g., disrupting benthic communities and/or severely impacting aquatic vegetation).

5.4.3.5 Trawling disrupts habitat and threatens marine species including benthic/bottom feeding fishes, invertebrates and other benthic organisms as it disrupts and homogenizes the substratum, can lead to species decline and reduced species diversity.

5.4.3.6 Fishing gear used by commercial fisheries results in bycatch or entanglement of non-targeted wildlife leading to injury and/or mortality.

5.4.3.7 Improperly sanitized equipment, relocation of fish, importation and release of non-native species, and the use of bait from a different location can spread invasive species and diseases from one waterbody to another.

5.4.3.8 Lead in fishing tackle is consumed by wildlife in the course of foraging and scavenging, causing injury and death.

5.4.3.9 Decreased survival rate of horseshoe crabs bled for medical uses results in a diminished food supply for migrating shorebirds.

5.4.4 Unintentional effects (large scale): *Includes unintended impacts to aquatic animals and/or vegetation as a result of large-scale/commercial fishing/harvesting practices (e.g., diamond-backed terrapin by-catch within crab traps without excluder devices), the introduction of fishing-gear (e.g., abandoned long lines, nets and hooks) into aquatic systems in which animals become entangled, injured or killed, the disruption of substrate/benthic habitat during commercial trawling activities.*

5.4.4.1 Fish introduced for sport fishing can negatively impact native species by competing for resources and/or altering the habitat (e.g., disrupting benthic communities and/or severely impacting aquatic vegetation).

5.4.4.2 Commercial/recreational shellfish dredging may impact marine ecosystems by uprooting submerged aquatic vegetation, disrupting substrates, increasing turbidity, and increasing predator species in localized areas.

5.4.4.3 Heavy fishing pressure in localized areas can prevent foraging birds from hunting prime areas decreasing their likelihood of success and reproduction.

5.4.4.4 Trawling disrupts habitat and threatens marine species including benthic/bottom feeding fishes, invertebrates and other benthic organisms as it disrupts and homogenizes the substratum, can lead to species decline and reduced species diversity.

5.4.4.5 Fishing gear used by commercial fisheries results in bycatch or entanglement of non-targeted wildlife leading to injury and/or mortality.

5.4.4.6 Overexploitation of riparian, estuarine, and marine fisheries may deplete food resources required by marine mammals, sea turtles, marine fish and piscivorous birds, in turn resulting lower reproduction and survival.

5.4.4.7 Improperly sanitized equipment, relocation of fish, use of bait from a different location, can spread invasive species and diseases from one waterbody to another.

5.4.4.8 Decreased survival rate of horseshoe crabs bled for medical uses results in a diminished food supply for migrating shorebirds.

5.4.5 Persecution/Control: *Harming, killing or controlling the presence of aquatic animals and plants considered undesirable and similar-looking species (i.e., those species misidentified as an undesirable species).*

5.4.5.1 Perception of diamondback terrapin as "bait stealers" may lead to harming/killing or relocation of individuals by recreational and/or commercial crabbers.

5.4.5.2 Illegal collection of protected turtle species as a result of misidentification as a snapping turtle which has a limited season for harvest.

Level 1	Level 2	Level 3	Level 4: NJ-specific Threat and Action Driver Statements

6 Human Intrusions and Disturbance: Threats to native habitat and/or fish/wildlife associated with non-consumptive uses of biological resources as a result of human activity.

6.1 Recreational Activities: People spending time in nature or traveling (by foot or motorized machinery) outside of established transportation or shipping corridors, usually for recreational reasons.

6.1.1 Off-road vehicles (motorized and non-motorized): *Vehicle use in natural landscapes that leads to the loss or degradation of habitat and/or aquatic systems and the decline of associated terrestrial and aquatic wildlife through habitat degradation and/or direct mortality (e.g., vehicles driving over dunes or through streams increase erosion and sediment threats degrading the habitat for beach nesting birds and aquatic wildlife, respectively, increase the spread of invasive plants which can alter the natural ecosystem, etc.).*

6.1.1.1 Inappropriate use of off-road vehicles creates new roads/trails which fragments habitat.

6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.

6.1.1.3 Increased risk of harassment that results in a change in wildlife behavior and/or direct mortality from vehicle strikes.

6.1.1.4 Increased noise pollution.

6.1.1.5 Vehicle use on beaches can cause disturbance, harms breeding and foraging habitats, and can cause direct mortality of beach-nesting birds.

6.1.1.6 Off-road vehicles can be a mechanism of transference of wildlife diseases and invasive plant species if gear and apparel are not properly sanitized between sites.

6.1.2 Boating: *Recreational boating within sensitive wildlife areas that cause the disruption of waterbird colonies, other nesting habitats, or roosting areas.*

6.1.2.1 Alteration and/or degradation of aquatic habitat.

6.1.2.2 Increased disturbance to marine animals and ocean-, bay- and marsh-associated birds which can alter their behavior decreasing the likelihood of their success and/or reproduction.

6.1.2.3 Motorized boat propellers can inflict physical harm aquatic wildlife species.

6.1.2.4 A lack of law enforcement staff limits NJ's ability to enforce the Marine Mammal Protection Act which restricts approach distances to marine mammals.

6.1.2.5 Watercraft can be a mechanism of transference of wildlife diseases and invasive plant species if gear is not properly sanitized between sites.

6.1.3 Use of beaches: *Pedestrian and dog activities within sensitive beach habitats that cause the disruption of nesting, roosting, foraging birds on beaches.*

6.1.3.1 Increases disturbance to beach nesting birds that reduces nesting success, and reduces foraging and resting opportunities for a wide range of nesting and migrating shorebirds.

6.1.4 Exploration of caves/mines: *Recreational activities within caves and mines that leads to the disruption of roosting or hibernating bats and other organisms. (Note: the risk of spreading disease is categorized under threat 8.)*

6.1.4.1 Poses significant threats to cave-hibernating bats as such activity forces bats to arouse from hibernation, depleting critical fat reserves needed to survive the winter.

6.1.4.2 Vandalism to mines and caves supporting colonies of wintering bats can lead to large-scale mortality during hibernation, and long-term habitat loss, reducing available hibernation sites, if damage goes unrepaired or uncontrolled.

6.1.4.3 Participants may introduce wildlife diseases when gear and apparel are not properly sanitized between sites.

6.1.5 Wildlife observation and photography: *Wildlife and nature observation and photography that leads to the disruption of wildlife activities (e.g., breeding, foraging, mating, etc.).*

6.1.5.1 Improperly conducted recreational activities may disrupt normal wildlife behaviors which can result in reduced reproductive success or survival, abandonment of critical sites, etc.

6.1.5.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

Level 1	Level 2	Level 3	Level 4: NJ-specific Threat and Action Driver Statements

6.1.6 Recreational use of cliffs, rocks and ridgelines: *Recreational activities such as hang-gliding and rock climbing and scrambling that leads to the disruption of wildlife activities along mountain ridgelines and within rocky habitats.*

6.1.6.1 Recreational rock-climbing and rock-scrambling can cause reduced reproductive success or reproductive failure for wildlife by disrupting normal reproductive behaviors and/or reduce breeding success by forcing them into suboptimal habitats.

6.1.6.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.1.6.3 Recreational use of rock outcrops and ridgelines by hikers and bikers can lead to direct mortality through wanton killing or incidental take, and alter natural behaviors, reducing breeding and/or foraging success.

6.1.7 Other: *Recreational activities (such as pyrotechnics or drones) that may disrupt normal wildlife activities, or recreation that results in transfer of pathogens deleterious to wildlife.*

6.1.7.1 Use of recreational or commercial pyrotechnics may cause temporary disturbance to wildlife, in particular to nesting birds.

6.1.7.2 Human presence in sensitive areas may introduce wildlife diseases or pathogens into the system.

6.1.7.3 Drone use in areas with sensitive wildlife (e.g., nesting and foraging birds, migrating and foraging/feeding whales) can alter their behavior and can cause disturbance that impacts their reproductive and/or foraging success.

6.2 Military Exercises: *Actions by formal or paramilitary forces without a permanent footprint.*

6.2.1 Military exercises: *Includes military-related activities and exercises at military bases.*

6.2.1.1 Military testing and training exercises may inflict disturbance and potential physical harm to wildlife.

6.2.1.2 Low to mid-frequency active sonar threaten marine mammals by disrupting navigation, foraging and communications ability, and activities may disrupt normal behaviors of nesting birds and other wildlife.

6.2.1.3 Lack of opportunity for non-federal wildlife managers to influence activities on military bases may result in detrimental impacts to SGCN and/or missed opportunities to engage in projects that benefit SGCN.

6.3 Work and Other Activities: *People spending time or traveling in natural environments for reasons other than recreation or military activities, such as law enforcement, maintenance activities, research, etc.*

6.3.1 Unauthorized research projects at significant habitats: *Includes excessive trampling impacts of rare natural communities, ground-nesting wildlife (birds, reptiles), and aquatic breeders such as amphibians, fish and mussels.*

6.3.1.1 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.1.2 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.1.3 Activities conducted without proper precautions may disturb and disrupt normal wildlife behaviors, which may impact reproductive success or survival, cause abandonment of critical sites, etc.

6.3.1.4 Illegal transfer of freshwater fish from one waterbody/watershed to another can result in the spread of non-native, invasive and/or undesirable fish or mussel species and/or diseases.

6.3.1.5 Illegal transfer of freshwater mussels from one waterbody/watershed to another can result in the spread of non-native, invasive and/or undesirable mussel species and/or diseases.

6.3.2 Authorized research projects at significant habitats: *Includes excessive trampling impacts of rare natural communities, ground-nesting wildlife (birds, reptiles), and aquatic breeders such as amphibians, fish and mussels, and also the impacts of sonar use on marine wildlife.*

6.3.2.1 Seismic air guns used during scientific marine research threatens spawning, feeding and breeding marine fishes in essential fish habitat areas off the NJ coast and may cause disturbance and physical harm to whales, dolphins, pinnipeds and sea turtles. Seismic surveys may also disturb marine mammals by disrupting navigation, foraging and communications ability.

Level 1	Level 2	Level 3	Level 4: NJ-specific Threat and Action Driver Statements

6.3.2.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.2.3 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.2.4 Activities conducted without proper precautions may disturb and disrupt normal wildlife behaviors, which may impact reproductive success or survival, cause abandonment of critical sites, etc.

6.3.2.5 Authorized transfer of freshwater fish from one waterbody/watershed to another can result in the spread of non-native, invasive and/or undesirable fish or mussel species and/or diseases.

6.3.2.6 Authorized transfer of freshwater mussels from one waterbody/watershed to another can result in the spread of non-native, invasive and/or undesirable mussel species and/or diseases.

6.3.3 Other "work" unrelated to research: *Includes maintenance and construction activities of structures such as bridges and dams that disturb or otherwise impact wildlife species using the structure to fulfill part of their life history requirements (e.g., breeding, roosting, etc.).*

6.3.3.1 Construction projects may disrupt normal wildlife behavior which can result in reduced reproductive success or survival, abandonment of critical sites, etc. (e.g., bridge-nesting birds).

6.3.3.2 Intensive dune and beach management (including overuse of dune fencing, sand mining, mechanical beach raking, storm clean up), reduces foraging habitat for beach nesting and migratory shorebirds, and poses risks of injury and mortality to unfledged chicks.

6.3.3.3 Beach nourishment projects create suitable habitat for beach-nesting birds in areas of high human use, increasing the likelihood of disturbance to the birds, harm to the eggs, and injury and/or mortality to chicks.

6.3.3.4 Workers may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.3.5 Unauthorized manipulation of water level (for dam repair, dredging, aquatic vegetation control, etc.) particularly during spawning season or during the summer when temperatures are high and dissolved oxygen is low can have negative impacts on fish and fish habitat.

7 Natural Systems Modifications: *Threats to native habitat and/or fish/wildlife associated with actions that convert or degrade habitat in service of "managing" natural or semi-natural systems, often to improve human welfare.*

7.1 Fire and Fire Suppression: *Changing fire frequency and/or intensity outside of its natural range of variation.*

7.1.1 Increase in Fire Frequency/Intensity: *Illegal and wild fires that result in the destruction or degradation of sensitive habitats and/or direct mortality of wildlife.*

7.1.1.1 Increase in frequency and intensity of wild fires as a result of droughts and heat waves drying out vegetation and litter.

7.1.1.2 Increase in frequency of wild fires as a result of illegal activities.

7.1.1.3 Unnatural fire regimes occurring as a result of military exercises.

7.1.1.4 Lack of diversity in age structure and composition of vegetation due to expansive, frequent fires.

7.1.2 Suppression of Fire Frequency/Intensity: *Lack of fire in fire-dependent habitats resulting in the degradation or loss of native landscapes and associated wildlife.*

7.1.2.1 Shift in vegetative communities as a result of suppression of natural fires.

7.1.2.2 Lack of diversity in age structure and composition of vegetation due to the suppression of fire.

7.2 Dams and Water Management/Use: *Changing water flow patterns from their natural range of variation either deliberately or as a result of other activities.*

7.2.1 Abstraction of Surface Water (domestic use): *Includes water diversion for domestic use; ditching, impounding, and stream channelization.*

7.2.1.1 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

Level 1	Level 2	Level 3	Level 4: NJ-specific Threat and Action Driver Statements

7.2.1.2 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.1.3 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, and eliminates shallow water habitats.

7.2.1.4 Water intake systems associated with municipal water supply threaten aquatic organisms due to injury or mortality from impingement and/or entrainment.

7.2.1.5 Abstraction of surface water may deplete upland mesic habitats of water needed by plants and wildlife.

7.2.1.6 Impoundments may alter the water levels in high marshes and mudflats, impacting those foraging and nesting habitats.

7.2.2 Abstraction of Surface Water (commercial use): *Includes water diversion for commercial use; ditching, impounding, stream channelization.*

7.2.2.1 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, eliminates shallow water habitats, and disrupts/removes stream bottom habitat.

7.2.2.2 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.2.3 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.2.4 Water intake systems associated with industrial use and power plants threaten aquatic organisms due to injury or mortality from impingement and/or entrainment.

7.2.2.5 Abstraction of surface water may deplete upland mesic habitats of water needed by plants and wildlife.

7.2.2.6 Impoundments may alter the water levels in high marshes and mudflats, impacting those foraging and nesting habitats.

7.2.3 Abstraction of Surface Water (agricultural use): *Includes water diversion for agricultural use; ditching, impounding, stream channelization.*

7.2.3.1 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.3.2 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, and eliminates shallow water habitats.

7.2.3.3 Impounding water to create or expand bogs for cranberry farming leads to the loss of natural wetlands and the alteration of the natural hydrology in the area.

7.2.3.4 Water intake systems associated with agriculture threaten aquatic organisms due to injury or mortality from impingement and/or entrainment.

7.2.3.5 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.3.6 Abstraction of surface water may deplete upland mesic habitats of water needed by plants and wildlife.

7.2.3.7 Impoundments may alter the water levels in high marshes and mudflats, impacting those foraging and nesting habitats.

7.2.5 Abstraction of Ground Water (domestic use): *Disrupting and/or permanently altering groundwater hydrology in support of the construction of residential developments.*

7.2.5.1 Heavy withdrawal of ground water for domestic use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.5.2 Abstraction of ground water may deplete upland mesic habitats of water needed by plants and wildlife.

Level 1	Level 2	Level 3	Level 4: NJ-specific Threat and Action Driver Statements

7.2.6 Abstraction of Ground Water (commercial use): *Disrupting and/or permanently altering groundwater hydrology in support of mining operations, hydrofracturing or other commercial activities (excluding development).*

7.2.6.1 Heavy withdrawal of ground water for industrial and commercial use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.6.2 Abstraction of ground water may deplete upland mesic habitats of water needed by plants and wildlife.

7.2.7 Abstraction of Ground Water (agricultural use): *Disrupting and/or permanently altering groundwater hydrology as a result of pumping water for irrigation.*

7.2.7.1 Heavy withdrawal of ground water for agricultural use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.7.2 Abstraction of ground water may deplete upland mesic habitats of water needed by plants and wildlife.

7.2.9 Small Dams: *Altering the physical, biological and chemical environment of streams and rivers as a result of installing small dams and/or conducting periodic dam-associated draw downs. For the purposes of NJ's SWAP, a "small dam" is considered to be any dam similarly defined in New Jersey's Dam Safety Standards, N.J.A.C. 7:20, June 16, 2008, i.e., any dam that impounds <15 acre-feet of water to the top of the dam, has less than 15 ft height of dam, and has a drainage area above the dam of 150 acres or less.*

7.2.9.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.9.2 Dams act as a barrier to fish movement, limiting the distribution of anadromous fish and fish that act as hosts for mussels.

7.2.9.3 Dams act as a barrier to movement, limiting the ability of aquatic or semi-aquatic wildlife to move safely between habitats.

7.2.10 Large Dams: *Altering the physical, biological and chemical environment of streams and rivers as a result of installing large dams and/or conducting periodic dam-associated draw downs. For the purpose of NJ's SWAP, a "large" dam" is considered to be any dam greater in structure size, volume of water retention or size drainage area above the dam than would otherwise meet the definition of a "small dam" used herein (and as is similarly defined at N.J.A.C. 7:20, Dam Safety Standards, June 16, 2008).*

7.2.10.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.10.2 Dams act as a barrier to fish movement, limiting the distribution of anadromous fish and fish that act as hosts for mussels.

7.2.10.3 Dams act as a barrier to movement, limiting the ability of aquatic or semi-aquatic wildlife to move safely between habitats.

7.2.11 Dams (size unknown): *Altering the physical, biological and chemical environment of streams and rivers as a result of installing dams (of a size that does not qualify as "small" or "large") and/or conducting periodic dam-associated draw downs.*

7.2.11.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.11.2 Dams act as a barrier to fish movement, limiting the distribution of anadromous fish and fish that act as hosts for mussels.

7.2.11.3 Dams act as a barrier to movement, limiting the ability of aquatic or semi-aquatic wildlife to move safely between habitats.

7.2.12 Culverts: *Placement or improper management of culverts that create barriers to terrestrial and/or aquatic organisms rather than assist their safe dispersal.*

7.2.12.1 Improper design, placement, installation and maintenance of culverts and other stream crossing structures can impede or prevent the movements of terrestrial organisms and can restrict or limit stream flow, impeding the movement of aquatic organisms along riparian corridors.

7.2.13 Stream Burial: *Loss of headwater and/or intermittent streams as a result of stream burial.*

7.2.13.1 Eliminates riparian habitats.

Level 1	Level 2	Level 3	Level 4: NJ-specific Threat and Action Driver Statements

7.2.13.2 Eliminates in-stream habitat and water resources for wildlife.

7.2.13.3 Alters the hydrology and quality of downstream aquatic and riparian habitats.

7.2.14 Tidal Water Management: *Hydrological alterations to tidal wetlands/waters as a result of tide gate structures and/or management.*

7.2.14.1 Freshwater tidal management for flood control alters water levels and salinity in tidal wetlands.

7.2.14.2 Tidal water management for the purpose of managing for select species may alter existing hydrologic or vegetative conditions to the detriment of other species.

7.2.14.3 Open marsh water management (and other techniques) to control mosquito populations may alter existing hydrologic or vegetative conditions to the detriment of other species.

7.2.14.4 Manipulation of marsh water levels may disturb nesting areas and flood nests.

7.3 Other Ecosystem Modifications: *Other actions that convert or degrade habitat in service of "managing" natural systems to improve human welfare.*

7.3.1 Shoreline Stabilization: *Installation of rip-rap, jetties, bulkheads, groins, etc. that alters the behavior of or otherwise impacts beach and marine wildlife. Installation of rip-rap, gabion and bulkheads on freshwater lakes and streams impacting freshwater aquatic and semi-aquatic species.*

7.3.1.1 Efforts to stabilize barrier islands and shorelines, including jetties, groins, bulkheads, interfere with the natural geological processes needed to create and maintain high quality habitat for beach strand species.

7.3.1.2 Efforts to stabilize stream corridors, particularly near roads and infrastructure, in which vegetated and dynamic shorelines are replaced with unvegetated and rigid structures such as rip-rap, gabion, concrete raceways and bulkheads interfere with fish spawning, nursery and foraging areas.

7.3.1.3 Efforts to stabilize barrier islands and shorelines, including jetties, groins, and bulkheads, degrade foraging areas for migrating whales and sea turtles.

7.3.2 Inappropriate timing of mowing: *Managing roadsides, rights-of-way, hay and other fields, etc. through mowing at times that increase the risk of disturbance and/or direct mortality to ground nesting/breeding birds, reptiles, small mammals and invertebrates.*

7.3.2.1 Increased risk of direct mortality and/or reduced productivity of wildlife, as well as reduced use by migrating species.

7.3.3 Removal of coarse woody debris (streams, forests, scrub-shrub habitats): *Removing woody debris that could otherwise provide shelter, nesting and foraging habitat for birds, reptiles and amphibians, and small mammals.*

7.3.3.1 Decreases the available detritus that normally accumulates behind and within stream obstructions, minimizing or eliminating food sources and shelters for fishes, invertebrates and amphibians.

7.3.3.2 Decreases habitat and/or corridor suitability due to limited or absent shelter and foraging habitat.

7.3.3.3 Removal of dead trees (snags), large felled logs (i.e., those $\geq$ 12" dbh), and other downed woody material diminishes nesting, roosting, and sheltering options for wildlife, and increases the ease at which deer can browse regenerating vegetation.

7.3.3.4 Decreases available basking, shelter, and foraging habitats.

7.3.4 Lack of natural disturbance patterns or ecosystem functions due to species loss: *Habitat alteration/shifting and/or species decline as a consequence of the loss of other plants and/or animals.*

7.3.4.1 The management and/or loss of beavers decreases natural disturbance patterns.

7.3.4.2 The loss of top-tier predators results in an overabundance of prey species which alter or degrade the natural function of the ecological system.

7.3.4.3 The extinction of prehistoric herd grazers and the more recent decline of the state's dairy industry has reduced the low-impact maintenance of early successional habitat relied upon by wildlife.

7.3.4.4 Human interference in natural processes such as clean up (e.g., beach-filling, shoreline hardening, tree/log removal from forests) after storms, in particular those causing post-hurricane washover and/or barrier island westward movement, and tree felling limits the disturbance needed to maintain appropriate habitats for wildlife.

Level 1	Level 2	Level 3	Level 4: NJ-specific Threat and Action Driver Statements

7.3.4.5 The lack of forest disturbance minimizes the diversity of herbaceous vegetation and other shrubs and trees that need a lot of sunlight to grow.

7.3.5 Poor habitat management: *Managing habitats and aquatic systems in a manner that is not beneficial to, and may cause harm and/decline of, the wildlife inhabitants and/or native plant communities.*

7.3.5.1 Improper or poorly scheduled maintenance of man-made corridors (e.g., roadsides and medians) can cause direct mortality to and may reduce productivity of wildlife.

7.3.5.2 Shifting from natural vegetation to lawns can cause increased temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

7.3.5.3 Vegetation clearing removes terrestrial and riparian corridors for animal movement, shelter, and resting areas.

7.3.5.4 Vegetation clearing or inappropriate alteration adjacent to aquatic habitats threatens aquatic species by degrading habitat and water quality (altering temperature and dissolved oxygen, increasing siltation and desiccation, etc.).

7.3.5.5 Habitat management that alters or removes vegetation without implementing long-term management increases the risk of invasive and exotic plants establishing themselves, outcompeting native vegetation.

7.3.5.6 Habitat management, including that which occurs on public and private lands, that does not consider timing and species' behaviors can result in the direct mortality and/or alteration or loss of habitat.

7.3.5.7 Improperly planned habitat management and/or mitigation efforts along roadsides and within the medians can attract wildlife and increase the risk of vehicle strikes.

7.3.5.8 Storm water outfall pipes can create habitats in small streams that are conducive to non-native predatory fish which can negatively impact native fish species.

7.3.5.9 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, eliminates shallow water habitats, and disrupts/removes stream bottom habitat.

7.3.5.10 Ditching, draining and filling of marshes and wetlands eliminates habitat and degrades the remaining surrounding areas for wildlife.

7.3.5.11 Salt marsh water management to control mosquitoes may result in negative effects on other species (e.g., changing hydrology of low and high marsh).

7.3.5.12 Lack of diversity in age structure and composition of vegetation due to lack of natural disturbances and/or vegetation management.

7.3.5.13 Private landowners with rare species on their properties are not always cooperative in the protection and management of the species' habitats. Landowners may be held accountable for their actions when they cause harm to the species or destroy the habitat, but it is often too late for the species' population.

7.3.5.14 Intentional felling and removal of dead standing trees or snags eliminates resting, nesting or feeding habitat, and precludes the snags eventual contribution to coarse woody debris and forest floor structure and habitat.

7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

7.3.5.16 Lack of proactive management to preserve or maintain viable and functioning marshes for SGCN wildlife.

7.3.5.17 Decreased diversity in height and species of herbaceous vegetation resulting in reduced cover and food for nesting and foraging wildlife.

7.3.5.18 Lack of funding or competitive market prices to maintain native grasslands for grassland-dependent species causes conversion of fallow or hay fields to other crops or shrublands.

8 Invasive and Other Problematic Species, Genes and Diseases: *Threats to native habitat and/or fish/wildlife from non-native and native plants, animals, pathogens/microbes, or genetic materials that have or are predicted to have harmful effects on biodiversity following their introduction, spread and/or increase in abundance.*

8.1 Invasive Non-native/ Alien Species/ Diseases: *Harmful plants, animals and pathogens not originally found within the ecosystem(s) in question and directly or indirectly introduced into it and spread by human activities.*

8.1.1 Unspecified Species: *Includes threats to native plants and animals by undetermined causes or general categories (e.g., "pest damage" to trees), but that are suspected or predicted to be as a result of the introduction of non-native plants, animals or pathogens.*

8.1.1.1 Displace or outcompete native species for resources.

Level 1	Level 2	Level 3	Level 4: NJ-specific Threat and Action Driver Statements

8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.

8.1.1.3 Invasive, non-native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

8.1.1.4 Invasive, non-native animals increase the risk of predation on native animals and/or herbivory on native vegetation.

8.1.1.5 Invasive, non-native animals and plants increase the risk of introduction and transference of diseases.

8.1.1.6 Invasive, non-native plants may create physical barriers for some species.

8.1.2 Invasive non-native aquatic animals: *Non-native, aquatic animals that have a detrimental impact on the natural aquatic ecosystem by damaging or causing change in the native vegetation (and potential food source), hydrology and/or a decline of native aquatic animals. Examples include Japanese shore crab, mitten crab, Asian clam (Corbicula), Zebra mussels, Flathead catfish and northern snakehead.*

8.1.2.1 Parasites introduced into the marine environment can alter the reproductive and feeding behavior of native wildlife, leading to their decline.

8.1.2.2 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminishing habitat suitability and reducing ecological integrity of natural communities, and may introduce disease into a population.

8.1.3 Invasive non-native aquatic plants: *Non-native, aquatic plants that have a detrimental impact on the natural aquatic ecosystem by damaging or causing change in the native vegetation (and potential food source), hydrology and/or a decline of native aquatic animals. Examples include Eurasian water-milfoil (Myriophyllum spicatum) and curly-leaf pondweed (Potamogeton crispus).*

8.1.3.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.4 Invasive non-native terrestrial/wetland animals: *Non-native, terrestrial and/or wetland-associated animals that have a detrimental impact on the natural ecosystem by damaging or causing change in the native vegetation (and potential food source), hydrology and/or a decline of native aquatic animals. Examples include feral cats, gypsy moth, Asian long-horned beetle (Anoplophora glabripennis), emerald ash borer (Agrilus planipennis), and hemlock wooly adelgid (Adelges tsugae), European starlings (Sturnus vulgaris) and house wrens.*

8.1.4.1 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.4.2 Free-roaming and feral domestic animals such as cats and dogs causes direct mortality of wildlife and disturbance to wildlife breeding and resting areas.

8.1.5 Invasive non-native terrestrial/wetland plants: *Non-native, terrestrial and/or wetland-associated plants that have a detrimental impact on the natural ecosystem by damaging or causing change in the native vegetation (and potential food source), hydrology and/or a decline of native aquatic animals. Examples include phragmites, Japanese barberry, multiflora rose, Ailanthus and garlic mustard.*

8.1.5.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.6 Invasive non-native fungal/bacterial diseases: *Non-native fungal and bacterial diseases that infect and have a detrimental impact on native wildlife and/or their habitats. Examples of such diseases include chytrid fungus (Batrachochytrium dendrobatidis) and Pseudogymnoascus destructans which causes white-nose syndrome in bats, and Sudden Oak Death fungus (Phytophthora ramorum).*

8.1.6.1 The introduction of non-native fungal and bacterial diseases threatens native populations and ecosystems.

Level 1	Level 2	Level 3	Level 4: NJ-specific Threat and Action Driver Statements

8.2 Problematic Native Species/Diseases: *Harmful plants, animals, pathogens and other microbes that are originally found within the ecosystem(s) in question, but have become out-of-balance or released directly or indirectly due to human activities.*

8.2.1 Unspecified Species: *Native species (plants, animals or pathogens) that are causing an imbalance in the natural ecosystem either through the destruction of habitat or intense predation/scavenging on other wildlife. This includes undetermined but suspected causes/species and broad, non-specific species categories such as "subsidized predators."*

8.2.1.1 Overabundant native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

8.2.1.2 Invasive pathogens and insects may increase in range and abundance as limiting factors (such as temperature) are altered as a result of climate change.

8.2.1.3 Invasive, native species can out-compete non-invasive species for resources (food, light, shelter), leading to the demise of some species populations.

8.2.1.4 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.2.2 Named Species: *Native species (plants, animals or pathogens) that are causing an imbalance in the natural ecosystem either through the destruction of habitat or intense predation/scavenging on other wildlife. This includes identified species as the cause of the impact such as white-tailed deer, beaver, fox, raccoon, crow and gull species, skunks, and raccoon roundworm.*

8.2.2.1 Dogs on beaches create severe disturbance to beach nesting birds and reduce their nesting success.

8.2.2.2 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.3 Introduced Genetic Material: *Human altered or transported organisms or genes that leads to the hybridization (and therefore, loss) of [true] native species.*

8.3.0 Introduced Genetic Material: *Human-induced hybridization or genetic dilution through direct introduction of species from another region or indirect introduction from habitat modification creating habitat connectivity that naturally would not have occurred otherwise.*

8.3.0.1 Introduction of farm-reared species (e.g., bobwhite and brook trout) for hunting and fishing purposes introduces genetic material into the native population when species hybridize.

8.3.0.2 Species hybridizing as a result of the alteration of, and subsequent connectivity of, habitats that once separated species.

8.4 Problematic Species/Diseases of Unknown Origin: *Harmful plants, animals, pathogens and other microbes currently found within or are a future risk to the ecosystem(s) in question but are of unknown or unconfirmed origin.*

8.4.1 Unspecified Species: *Problematic species/diseases including those that are currently unidentified or non-specific species categories causing or suspected to cause harm to native wildlife and/or their habitats.*

8.4.1.1 Non-native or poorly understood diseases and parasites could potentially impact native animals.

8.4.2 Named Species: *Identified problematic species/diseases causing or suspected to cause harm to native wildlife and/or their habitats but for which its origin is unknown or unconfirmed. Examples of such a species are Ophidiomyces ophiodiicola believed to be the source of snake fungal disease but has not been confirmed as a native or non-native fungus to New Jersey as with Ranavirus (infecting amphibians and turtles), also not confirmed as native or non-native to NJ.*

8.4.2.1 Honey bee diseases such as Deformed Wing Virus (DWV) and Nosema ceranae have been found to able to be transmitted to wild bumble bees.

8.4.2.2 Diseases of unknown origin, such as snake fungal disease and Ranavirus, can cause significant mortality among native animal populations.

Level 1	Level 2	Level 3	Level 4: NJ-specific Threat and Action Driver Statements

8.5 Viral/Prion-induced Diseases

8.5.1 Unspecified Species (Disease)

8.5.1.1 There is a large knowledge gap regarding the existence of, or potential for, other diseases impacting native wildlife.

8.5.2 Named Species (Disease): *Includes West Nile Virus, arenavirus, sudden oak death, Avian Influenza.*

8.5.2.1 Diseases such as West Nile Virus, arenavirus, sudden oak death, Avian Influenza, and snake fungal disease cause morbidity or mortality to native populations.

8.5.2.2 Viral Hemorrhagic Septicemia (VHS) (recently introduced into the Great Lakes) has caused mortality in 30 common fish species across many families. Although many of the fish SGCN have not been tested, it is hypothesized that they may be vulnerable. If introduced into NJ, VHS is predicted to cause widespread fish kills.

8.6 Diseases of Unknown Cause: *Diseases impacting habitat and/or fish/wildlife which have not been identified.*

8.6.0 Unknown Diseases

8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution: *Threats to native habitat and/or fish/wildlife from the introduction of exotic) and/or excess materials or energy from point and nonpoint sources.*

9.1 Domestic and Urban Waste Water: *Water-borne sewage and non-point runoff from housing and urban areas that include nutrients, toxic chemicals and/or sediments.*

9.1.1 Sewage: *Habitat is degraded and/or animals are harmed or killed as a result of leaking septic systems, discharge from municipal wastewater treatment plants, untreated sewage.*

9.1.1.1 Degradation of aquatic and marine water quality and habitats by changing turbidity, flow and water chemistry.

9.1.1.2 Leads to increased eutrophication and algae blooms that result in oxygen depletion.

9.1.1.3 Contaminants in sewage treatment effluents and Combined Sewer Overflows can cause developmental and behavioral abnormalities and reproductive failure in wildlife.

9.1.2 Run-off: *Habitat is degraded and/or animals are harmed or killed as a result of runoff of oil and sediment from roads, chemicals from roads and lawns, road salt, golf course chemicals, etc. into adjacent aquatic and terrestrial habitats.*

9.1.2.1 Chemical fertilizers and nutrient run-off changes the pH in streams and ponds and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.1.2.2 Contaminants degrade aquatic and marine water quality and can bioaccumulate in benthic organisms, threatening wildlife by causing developmental and behavioral abnormalities and reproductive failure.

9.1.2.3 Contaminants from road runoff (oil, sediment, salt, etc.) impact native vegetation and the species that rely upon them, degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2 Industrial and Military Effluents: *Water-borne pollutants from industrial and military sources including mining, energy production, and other resource extraction industries that include nutrients, toxic chemicals and/or sediments.*

9.2.1 Oil Spills: *Habitat is degraded and/or animals are harmed or killed as a result of terrestrial and aquatic leakage from fuel tanks and spills from pipelines, and from PCBs in river sediments and the subsequent impacts of bioaccumulation of PCBs in the food web.*

9.2.1.1 Oil spills render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.1.2 Oil spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

Level 1	Level 2	Level 3	Level 4: NJ-specific Threat and Action Driver Statements

9.2.1.3 Oil spills cause external oiling of wildlife and ingestion of oil, both of which can injure or kill wildlife.

9.2.2 Seepage from Mining: *Includes acid mine drainage, mine tailings.*

9.2.2.1 Contaminants from mining degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2.3 Other: *Other industrial pollutants impacting habitat and/or animals which are not specifically captured under the classification scheme such as toxic chemicals from factories, illegal dumping of chemicals, other industrial effluent, ship waste discharge, etc.*

9.2.3.1 Point and nonpoint source pollution such as polychlorinated biphenyls (PCBs), pesticides, heavy metals, and endocrine disrupting compounds (EDC's) into freshwater and marine systems pose threats to wildlife through direct contact and/or ingestion, and to aquatic species and their predators through bioaccumulation, impacting the reproductive success and neurological function of many avian and fish species.

9.2.3.2 Chemical spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.3.3 Chemical spills may render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.4 Other: Hydrofracturing: *The threat of future (and when/if appropriate, current) hydrofracturing-associated toxic spills from failure of wastewater ponds, failure of pipe casements, etc.*

9.2.4.1 Contaminants from hydrofracturing degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2.4.2 Uncontrolled effluents escaping from hydrofracturing facilities can cause injury to wildlife and alter normal behaviors.

9.2.5 Other: Industrial toxic settling ponds: *Harm or death to animals that enter or drink from toxic settling ponds.*

9.2.5.1 Surficial or open industrial effluent ponds can cause injury or death to wildlife that become exposed through ingestion or submersion.

9.3 Agricultural and Forestry Effluents: *Water-borne pollutants from agricultural, silivicultural, and aquaculture systems that include nutrients, toxic chemicals and/or sediments, including the effects of these pollutants on the site where they are applied.*

9.3.1 Nutrient Loads: *Aquatic and terrestrial environments become degraded or destroyed and/or animals are harmed as a result of nutrient loading from fertilizer run-off, manure from feedlots, nutrients from aquaculture, etc.*

9.3.1.1 Chemical fertilizers and nutrient run-off changes the pH in streams, ponds and wetlands and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.3.1.2 Animal waste degrades terrestrial and aquatic habitats, especially streams, ponds and wetlands, resulting in eutrophication, which disrupts oxygen and nutrient balances, and causes injury and mortality to aquatic organisms.

9.3.1.3 Organic nutrient inputs from aquaculture may, depending upon type and location, adversely impact intertidal and subtidal habitats and water bodies where there is insufficient tidal flushing.

9.3.1.4 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades wetland and aquatic habitats with runoff, increasing sediment and nutrient loads and pH.

9.3.1.5 Conversion of native forests to plantations degrades wetland and aquatic habitats through increased runoff.

9.3.2 Soil Erosion and : *Aquatic and terrestrial environments become degraded or destroyed and/or animals are harmed as a result of soil erosion from overgrazing, increased run-off and hence sedimentation due to the conversion of forests (or other natural landscapes) to agricultural lands, etc.*

9.3.2.1 Soil erosion, sedimentation and destruction of streambanks and riparian buffers degrade waters making them unsuitable for riparian-dependent wildlife.

9.3.2.2 Soil erosion and sedimentation limit the re-establishment of plants needed by terrestrial wildlife as cover and a food base.

Level 1	Level 2	Level 3	Level 4: NJ-specific Threat and Action Driver Statements

9.3.2.3 Conversion of native forests to plantations degrades wetland and aquatic habitats through increased sedimentation.

9.3.3 Herbicides and Pesticides: *Herbicide, pesticides and fertilizer run-off from agricultural fields degrade or destroy adjacent aquatic and terrestrial habitats and/or cause harm to non-target species (plants and animals).*

9.3.3.1 Pesticides degrade terrestrial and aquatic habitats, especially streams, ponds and wetlands. Aquatic wildlife are particularly sensitive to these contaminants, which can cause developmental and behavioral abnormalities and reproductive failure. Some contaminants may bioaccumulate in predatory fish and birds and disrupt reproduction.

9.3.3.2 Use of rodenticides can cause secondary actions of injury and death to animals in the course of scavenging.

9.3.3.3 Use of pesticides can directly harm non-target species through direct contact and/or by reducing and/or contaminating their food supply.

9.3.3.4 Use of herbicides can destroy beneficial food and nectar plants for insects.

9.3.4 Other: *Other agricultural and/or forestry management-related pollutants impacting habitat and/or animals which are not specifically captured under the classification scheme; identify type/source.*

9.3.4.1 Spills, leaks or discharges of fuel, oil or other contaminant fluids from machinery or equipment used in the normal course of agricultural or forestry activities can degrade or destroy adjacent aquatic and terrestrial habitats and/or cause harm to non-target species (plants and animals).

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture: *Herbicide and pesticides applied in environments through directional application (i.e., not aerial spraying) that lead to the harm of non-target species (plants and animals) such as the use of larvacides and adulticides for mosquito control that may harm amphibians and beneficial invertebrates.*

9.3.5.1 Use of pesticides, insecticides, and/or herbicides can directly harm non-target species, such as amphibians and beneficial invertebrates through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5.2 Use of herbicides can destroy beneficial food and nectar plants for insects.

9.3.5.3 Use of pesticides and herbicides can minimize the abundance of invertebrates needed as a food source for many birds.

9.3.5.4 Improper use of current insecticides, such as those containing esfenvalerate, prallethrin, or piperonyl butoxide, or past use of pesticides containing chlordane still present in the soils, are toxic to various wildlife species, and can cause injury, mortality, or other effects that impair population viability.

9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.4 Garbage and Solid Waste: *Threats to native fish/wildlife as a result of rubbish and other solid materials.*

9.4.1 Direct hazards to wildlife: *Includes waste that can harm or kill wildlife by entangling or strangling animals leading to their predation, starvation or fatal injury, causing fatal blockages in their digestive systems when waste is mistakenly eaten, etc., including but not limited to municipal solid waste, litter from cars and boats, waste that entangles or strangles wildlife, construction debris, etc.*

9.4.1.1 Wildlife may ingest garbage causing choking or impingement in the digestive system, or they may become physically entangled in it (e.g., plastic or abandoned fish nets); conditions that make them unable to feed or drink, cause them to suffocate or drown, or otherwise restrict the animal's movement making them more susceptible to predators, starvation or injury.

9.4.1.2 Garbage and solid waste destroys natural habitats and obstructs wildlife movements.

9.5 Air-Bourne Pollutants: *Atmospheric pollutants from point and nonpoint sources.*

9.5.1 Acid Rain: *Habitat and water quality degradation and/or the acidification of ocean water as a result of acid rain, excess nitrogen deposition, wind dispersion of pollutants or sediments, radioactive fallout, smoke from forest fires, etc.*

9.5.1.1 Causes acidification of water bodies, resulting in changes to aquatic and marine communities and reducing biodiversity, and creating conditions that are unsuitable for some aquatic (freshwater and marine) and semi-aquatic species that are sensitive to pH shifts.

Level 1	Level 2	Level 3	Level 4: NJ-specific Threat and Action Driver Statements

9.5.1.2 Leaches calcium from the soils which in turn reduces the availability of prey, particularly calcium-rich prey such as snails.

9.5.2 Smog: *Habitat and water quality degradation as a result of smog from vehicle emissions, smoke from forest fires, wind dispersion of pollutants or sediments, and in the future, potentially, hydrofracturing pollutants, etc.*

9.5.2.1 Fine airborne particulate pollutants (such as smoke from controlled burns, soil particles from plowing arid soil, etc.) can adversely affect low mobility wildlife species, including avian species during nesting.

9.5.3 Ozone: *Impacts to habitat and water quality and animals as a result of ground-level ozone formed in association with vehicle emissions, factory smoke emissions, smoke from forest fires, wind dispersion of pollutants or sediments, etc.*

9.5.3.1 Ozone pollution adversely affects many native plant species, altering the health and composition of wildlife species habitats, and prolonged exposure can affect the respiratory systems of affected wildlife.

9.5.4 Other: *Other air-bourne pollutants impacting habitat and/or animals which are not specifically captured under the classification scheme; identify type/source.*

9.5.4.1 Dust and/or airborne sedimentation from construction sites, agricultural operations or related earth disturbances can introduce mineral or organic sediments into adjacent wildlife habitats, degrading their quality and suitability for wildlife short-term and/or long-term.

9.5.5 Methane: *Includes methane from hydrofracturing emissions, refineries and landfills.*

9.5.5.1 Methane burners/flares, particularly "intermittent" flares, can result in direct mortality or harm to raptors and other avian species.

9.5.6 Herbicides and Pesticides: *Herbicide and pesticides applied to environments through aerial application that lead to the harm of non-target species (plants and animals) such as the aerial application of chemicals to control pests, such as gypsy moths, mosquitos.*

9.5.6.1 May result in injury or direct mortality of non-target species.

9.6 Excess Energy: *Inputs of heat, sound, or light that disturb or otherwise impact wildlife or ecosystems.*

9.6.1 Light Pollution: *Lighting that causes changes in animal behavior that may result in injury, death or failed reproduction such as lamps attracting insects, tower lights disorienting migrating birds, etc.*

9.6.1.1 Artificial lighting can reduce suitability of adjacent habitat for species sensitive to artificial lights by disorienting wildlife, reducing foraging suitability or success, or increasing visibility to predators, resulting in reduced diversity and/or productivity of species in adjacent habitat.

9.6.2 Thermal Pollution: *Changes in water temperatures as a result of discharged heated water from power plants and impervious surfaces, damaging atmospheric radiation resulting from ozone holes, etc. that causes changes in animal behavior and may result in injury, death, failed reproduction, or detrimental shifts in migratory patterns.*

9.6.2.1 Water temperature changes due to industrial discharge of heated water may impact species composition in the receiving waterbody. Species such as sea turtles and migrating fish may be attracted to the thermal plume and become more vulnerable to mortality during emergency shutdowns during cooler months.

9.6.2.2 Water temperature changes to aquatic systems can deter or preclude use by SGCN (e.g., alter habitat suitability for wildlife species, reduce prey base) or present stressors that are harmful if not fatal to wildlife.

9.6.2.3 Water temperature changes due to industrial discharge of heated water in aquatic systems may be stressful/fatal to free floating freshwater mussel glochidia.

9.6.3 Noise Pollution: *Noise that causes changes in animal behavior that may result in injury, death, failed reproduction, or detrimental shifts in migratory patterns such as noise from highways or airplanes, sonar from submarines that disturb whales, the construction activities associated with offshore wind and other energy development, etc.*

9.6.3.1 Acute and chronic noise pollution in and adjacent to terrestrial and aquatic (marine and freshwater) environments could disrupt normal behaviors of wildlife such as migration, communication, feeding, eluding predators, resting and breeding, etc.

Level 1	Level 2	Level 3	Level 4: NJ-specific Threat and Action Driver Statements

11 Climate Change and Severe Weather: *Threats to native habitat and/or fish/wildlife associated with long-term climatic changes or other severe weather that may eliminate or otherwise harm or degrade a vulnerable species or habitat, respectively.*

11.1 Habitat Shifting or Alteration: *Major changes in habitat composition and location not associated with sea-level rise.*

11.1.0 Macro- and Micro-Climate Alterations: *Permanent changes in macro- and micro-habitat conditions that reduce habitat suitability for habitat specialist or niche species.*

11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.2 Droughts: *Periods in which rainfall falls below the normal range of variation.*

11.2.1 Droughts: *Increased periods and/or frequency of droughts leading to changes in the hydrology of aquatic systems and ground water and subsequent loss/alteration of aquatic and terrestrial habitats, the elimination of small wetlands and streams, etc., and subsequent impacts or loss of animals dependent on such habitat such as freshwater mussels.*

11.2.1.1 Contribute to hardened soils, decreasing water recharge during rains and increasing the likelihood of flash floods during storms.

11.2.1.2 Lead to lower groundwater levels and therefore, less available water for people and habitats.

11.2.1.3 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

11.2.1.4 Increase stress on vegetation making them more susceptible to pest damage.

11.2.1.5 Leads to lower river levels that may impact the ability of anadromous species to reach spawning grounds.

11.2.1.6 Increased desiccation risk for amphibians and altered wetland hydrology for critical habitats including breeding pools.

11.3 Temperature Extremes: *Periods in which temperatures exceed or go below the normal range of variation; includes heat waves, extreme cold spells, oceanic temperature changes, etc.*

11.3.1 Temperature extremes: *Periods of extreme temperature ranges (high or low) that lead to the loss of habitats, disrupts migratory patterns of both marine and terrestrial wildlife, reduces water flow in streams/rivers, increases water temperature and/or changes water pH which impacts aquatic animals, lowers the water level of wetlands, riverine, lacustrine and vernal pool habitats, and causes premature drying of vernal habitats.*

11.3.1.1 Increasing temperatures may cause habitat loss and degradation by desiccating and/or raising the temperatures of small wetlands and streams leading to the loss of freshwater mussels and other aquatic species and species reliant upon these habitats.

11.3.1.2 Increased temperatures can negatively impact wetland, riverine, lacustrine and vernal pool-associated or -dependent wildlife by reducing flows, increasing water temperatures, lowering water levels and causing premature drying of vernal habitats.

11.3.1.3 Temperature extremes of surface water and air degrades marine habitats and ecosystems, threatening marine wildlife. Such extremes also disrupt offshore currents and migratory patterns, species' ranges, and/or impact communities/food chains, all of which further impact the ecosystem.

11.3.1.4 Extremely low temperatures and/or extensive periods of unseasonably low temperatures during critical life history stages (e.g., hibernation, gestation/nesting) can alter animals' behaviors and decrease survivorship.

Level 1	Level 2	Level 3	Level 4: NJ-specific Threat and Action Driver Statements

11.4 Storms and Flooding: *Extreme precipitation and/or wind events, including hurricanes, tornados, ice storms, excessive beach erosion.*

11.4.1 Storms and flooding: *Extreme flooding alters the hydrology of aquatic habitats and causes water quality degradation as a result of increased silt loads, stream bottom shifting and increased turbidity of streams and rivers. It also disrupts migratory patterns of both marine and terrestrial wildlife, and coastal flooding breaches existing natural sand berms along shores that normally limit tidal flooding events and cause conversion of "barrier wetlands" to open water or other natural communities.*

11.4.1.1 Extreme storms and flooding events threaten aquatic and marine wildlife through habitat degradation and alteration, including alterations to off-shore or back-bay benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic and marine wildlife.

11.4.1.2 Potentially damage coastal habitats, including beach- and marsh-nesting bird habitats and interdunal wetlands, and can increase marsh erosion.

11.4.1.3 Increase risk of saltwater intrusion to freshwater habitats altering the water chemistry and potentially altering aquatic wildlife community.

11.4.1.4 Flood events alter river or stream morphology, benthic conditions and habitat availability for wildlife, cause bank erosion, and deposit sediments in floodplain wetlands altering wildlife habitat.

11.4.1.5 Storm damage can alter forest structure via blow-downs or micro-bursts, and can destroy bird nesting in the locales where the storms occur.

11.4.1.6 Increased storms and flooding reduce nesting success, especially for ground-nesting birds.

11.4.1.7 Potentially damage coastal habitats, including beach and marsh habitats used by spawning horseshoe crabs, nesting diamondback terrapins, and resting and foraging birds.

11.4.2 Increased rainfall: *Increased periods and frequency of rainfall saturates the ground and limits water recharge within watersheds, causes long-term increases in soil moisture.*

11.4.2.1 Extreme rain events threaten aquatic wildlife through habitat degradation and alteration, including alterations to benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic wildlife.

11.4.2.2 Extreme rain events can damage wildlife nesting and resting habitats, including impacts to avian eggs and chick and small mammal survivorship.

11.4.2.3 More frequent rain events can alter terrestrial and wetland vegetation communities as well as wetland hydrology, shifting wildlife community use.

11.5 Sea-level Rise: *Habitat alterations, degradation and/or destruction and subsequent impacts on animals dependent on those habitats as a result of salt water intrusion such as existing tidal marshes converting to open water and adjacent uplands converting to tidal marshes.*

11.5.0 Sea-level Rise

11.5.0.1 Contributes to the conversion of high salt marsh to low salt marsh, threatening species that depend on high marsh habitat and those dependent on the marsh-upland ecotone.

11.5.0.2 Increased risk of saltwater intrusion into freshwater systems impacting associated wildlife and native vegetation.

11.5.0.3 Alters salinity conditions; increased salinity will alter and degrade aquatic ecosystems, threatening anadromous species by shifting normal breeding areas upstream into potentially unsuitable areas, and causing mortality to salt-intolerant mussels and other species by inundating areas of the lower Delaware River and tributaries.

11.5.0.4 Increased erosion of beach, mudflat and marsh habitats critical for a number of coastal species to fulfill life history requirements.

11.5.0.5 Sea-level rise will result in the conversion of some upland habitats to tidal marshes impacting the species that rely upon those upland areas.

11.5.0.6 Alters salinity conditions in back bays and tidal creeks, thereby impacting food availability, composition and abundance for wildlife.

11.5.0.7 Sea level rise exacerbates marsh loss caused by prior human manipulations (e.g., impoundments, grid-ditching) that reduced the elevation of the marsh.

Level 1	Level 2	Level 3	Level 4: NJ-specific Threat and Action Driver Statements

11.6 Phenology Shifting or Alteration: *Changes in the seasonal cycles of plants and animals that causes mismatched timing of life history requirements with food sources and/or alters the range of species leading to competition or hybridization.*

11.6.1 Phenology shifts related to pollination ecology: *Timing of host plant life history is mismatched with timing of wildlife life history, i.e., plants may bloom before required pollinators are present leading to failed foraging, decreased opportunity for pollination and thus, propagation within local ecological systems.*

11.6.1.1 Alters inter-specific relationships of wildlife and vegetation, ultimately leading to detrimental impacts on the ecological system.

11.6.2 Phenology shifts related to predator-prey ecology: *Mismatched timing of animal movements with their prey item's life cycle leading to a lack of food and subsequent illness, failed reproduction and/or death (e.g., migratory songbirds may not return in spring at time of maximum caterpillar emergence).*

11.6.2.1 Alters inter-specific relationships (e.g., competition, parasitism, predation) of wildlife, ultimately leads to detrimental impacts on the ecological system.

11.6.2.2 Shifts timing of species migration, breeding and hibernation, and available food resources, causes redistribution of species, or mortality for species that are unable to relocate due to their already isolated habitat or limited mobility.

11.6.3 Phenology shifts related to species redistribution: *Changes in species distribution driven by climate-caused changes in species' ranges and/or competition.*

11.6.3.1 Shifts in timing of species migration, breeding and hibernation, and available food resources, as a result of wildlife range shifts driven by climate change.

11.6.3.2 Shifts in nesting times or egg incubation durations can limit nest success and longterm populations.

12 Resource Management Needs: *Need for information on fish/wildlife species, species suites and/or their habitats to inform future conservation efforts and management decisions.*

12.1 Resource information collection needs: *Need to collect information on fish and wildlife and/or their habitats.*

12.1.1 Lack of initial baseline inventory: *Need to gather baseline data regarding fish, wildlife populations and/or habitat status, availability and condition as part of long-term trend analysis.*

12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.1.3 Lack of studies specific to structural shellfish aquaculture (racks, bottom cages, bottom screens, etc.) and tending activities which may adversely impact horseshoe crabs, shorebirds and other benthic-dependent species.

12.1.1.4 Lack of information on the morphometrics and trends of coastal salt marshes and salt marsh islands.

12.1.1.5 Lack of information regarding the SGCN populations that use managed salt marshes and the best techniques for making improvements for marsh-dependent SGCN wildlife.

12.1.1.6 Lack of information regarding migratory pathways and response of wildlife to lights and noise associated with offshore wind turbines.

12.1.2 Lack of up-to-date existing information: *Need to conduct (routine, regular, ongoing) surveys/assessments to provide the up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.*

12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.2.2 Lack of wildlife monitoring at sites with structures that pose high risk of mortality to SGCN wildlife.

12.1.3 Need to answer research question: *Need to address unanswered or unresolved conservation question(s) regarding fish/wildlife species, species suites and/or their habitats that will inform future conservation efforts and management decisions.*

12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

Level 1	Level 2	Level 3	Level 4: NJ-specific Threat and Action Driver Statements

12.1.3.2 There is an urgent need to answer questions about the future vulnerability or resiliency of NJ's cave-hibernating bats to White-nose Syndrome, and about the potential for an effective treatment to the disease.

12.1.3.3 Lack of studies specific to structural shellfish aquaculture (racks, bottom cages, bottom screens, etc.) and tending activities which may adversely impact horseshoe crabs, shorebirds and other benthic-dependent species.

12.1.3.4 Lack of information regarding the potential short- and long-term impacts of wind turbines and other tall coastal structures on migratory populations.

12.1.4 Need to develop new technique: *Need to develop and evaluate new species or habitat survey methods or techniques because current survey/assessment efforts fail to obtain the necessary data. Need to develop and evaluate new (species or habitat) management techniques.*

12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.

12.1.4.2 Improve and evaluate survey methods for species not easily detected through standard survey methods.

12.1.4.3 Lack of techniques for high marsh preservation that includes impoundments and elevated islands.

12.1.4.4 Lack of consideration of habitat management opportunities in the course of salt marsh management for mosquito control.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms

12.3.0.1 Regulatory habitat protections within state land use regulations are spatially limited to specific geographic areas (e.g., Pinelands, Coastal Area) or geographic features (e.g., wetlands, streams) and so fail to protect critical habitats that exist outside of these regulated areas.

12.3.0.2 Delays between State species status reviews and regulation amendments to incorporate the findings leads to extended periods when imperiled species do not receive the benefit of land use and other regulatory protections.

12.3.0.3 Lack of a licensing program and standards for NJ Nuisance Wildlife Control Operators (NWCOs) leads to inadequate controls over handling of wildlife and lack of reporting of non-game/SGCN species (and all wildlife) encountered in nuisance situations.

12.3.0.4 The NJ Administrative Code (N.J.A.C.) fails to protect native, freshwater fish species from collection and/or their use as bait.

12.3.0.5 NJDEP land use regulations provide no protection for spawning habitats of native, freshwater fish that are identified as candidates for State endangered, threatened, or special concern status.

12.3.0.6 Certain geographic or habitat features, such as vernal pools and headwater wetlands or streams, may be too small, mischaracterized, or misidentified to benefit from regulatory protection.

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.8 Lack of stable funding to support State marine fisheries research, monitoring, and management is a significant impediment to biologically-based management of fish and shellfish populations in New Jersey, which can result in overharvest and severe population declines.

12.3.0.9 Prescribed burns implemented by the NJ Forest Fire Service are constrained by State air quality regulations to a timeframe where seasonal weather conditions are less than ideal for effective burning. As a result, the Forest Fire Service is limited in the number of overall prescribed burns it can implement to restore habitat for wildlife.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

Level 1	Level 2	Level 3	Level 4: NJ-specific Threat and Action Driver Statements

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform

12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.

12.4.0.3 Lack of internal understanding regarding beneficial habitat impacts of storm events leads to policies and practices that reverse or decrease such beneficial effects (e.g., beach-filling, shoreline hardening, "hazard" tree and log removal from forests, etc.

12.4.0.4 Lack of a mandatory reporting system for lost crab traps threatens diamondback terrapins and other marine species due to persistent trapping/attraction of organisms by ghost pots.

12.4.0.5 Bureau of Forest Fire Management policy has traditionally implemented prescribed burns on State lands for the sole purpose of public safety (i.e., addressing hazard fuel reduction), missing opportunities to burn in a manner that would additionally manage habitat for ecological diversity.

12.4.0.6 Techniques for ecological management or restoration of shorelines are not fully developed or evaluated for effectiveness for target and non-target SGCN in coastal areas.

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs: *Need to inform and educate citizenry of fish and wildlife issues, habitat needs and available resources.*

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats: *Lack of general knowledge or understanding (ecological literacy) of fish and wildlife and habitat conservation.*

14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions: *Need to develop greater understanding of and support for agency's/organization's conservation work among general public and constituent groups (i.e., conservation partners, government agencies, the general public, farmers, business, homeowners, recreationists).*

14.2.1.1 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various forest management practices.

14.2.1.2 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various aquatic and riparian management practices.

14.2.1.3 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various coastal management practices.

14.2.1.4 Need to develop greater understanding of and support for efforts implemented to maintain disturbance-free habitats that allow coastal wildlife populations to thrive alongside human residential and recreational uses.

14.2.1.5 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various wetland management practices.

Level 1	Level 2	Level 3	**Level 4: NJ-specific Threat and Action Driver Statements**

15 Administrative Needs: *Need to provide the tools for a fish and wildlife agency to support its agency functions.*

15.2 Coordination/administration needs: *Need for fish and wildlife agency administrative support and program coordination.*

15.2.3 Need for multi-state, regional and landscape scale planning: *Needs that can only be achieved via coordination or action among states or regional conservation partners/stakeholders.*

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

This page intentionally left blank

Appendix I: List of the Conservation Actions

List of Conservation Actions

Below is the list of conservation actions as defined and categorized by the three-level lexicon of actions developed by the U.S. Fish & Wildlife Service for their database, Tracking and Reporting on Actions for Conservation of Species (TRACS). In addition, New Jersey chose to develop an even finer fourth level of actions that are specific to New Jersey.

TRACS Conservation Action Categories			
Level 1	**Level 2**	**Level 3**	**Level 4: NJ-specific Conservation Action Statements**

1 Coordination and Administration

1.2 Incentives: *Development and delivery of economic incentives to private landowners to influence responsible stewardship of land/water and specific species.*

1.2.1 Incentives

1.2.1.1 Enhance critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates through incentive programs with adjacent private landowners to increase the effective size of the habitat.

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.3 Secure and promote the protection/restoration of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through incentive programs.

1.2.1.4 Secure and promote the protection, restoration, and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts through incentive programs.

1.2.1.5 Secure and promote the protection/restoration of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through incentive programs.

1.2.1.6 Secure and promote the protection/restoration of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers through incentive programs.

1.2.1.7 Secure and promote the protection/restoration of fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.9 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing Forestry Stewardship Programs.

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

Level 1	Level 2	Level 3	**Level 4: NJ-specific Conservation Action Statements**

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.12 Create incentives (non-monetary and/or monetary) for land developers to redevelop abandoned areas (e.g., shopping centers, office complexes) to minimize the loss of natural habitats and reduce the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.14 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of herbicides and pesticides, and implementing more ecologically safe strategies when using such products.

1.2.1.15 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of rodenticides, and implementing more ecologically safe strategies when using such products.

1.2.1.16 Create incentives (non-monetary and/or monetary) within State regulations (mitigations requirements or credit, BMP satisfaction, etc.) to promote the use of retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.17 Develop a public-relations oriented certification program for private retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.18 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and land managers to control and reduce the impacts of invasive, native and non-native species in order to increase structural habitat diversity.

1.2.1.19 Create incentives for federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to farmers, woodland landowners, and private landowners to adopt and/or endorse consistent BMPs concerning controlled burns to maintain and/or improve wildlife habitat.

1.2.1.20 Coordinate across government agencies and non-government organizations to create or expand upon tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMP's.

1.2.1.21 Create and/or support market-based programs that subsidize or create branding for products derived sustainably from managed wildlife habitats.

1.2.1.22 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to horse/livestock farm owners and managers to increase structural habitat diversity in and around the farms by managing vegetation for a variety of species, in particular, farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

Level 1	Level 2	Level 3	Level 4: NJ-specific Conservation Action Statements

1.2.1.23 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to provide cost shares and/or plan approvals for management based on management approaches and prescriptions.

1.2.1.24 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners, with habitat of suitable patch size to support breeding grassland-dependent species, to alter the timing of vegetation management to benefit grassland and pollinator species.

1.2.1.25 Create incentives (non-monetary and/or monetary) within State regulations to assist and programs to deliver those incentives to aquaculture growers to relocate, for example, from intertidal to subtidal lease areas through buyouts of leases or microloans, and/or promoting on-lease conservation measures used by aquaculture growers (such as the implementation of conservation easements, use of living shorelines, incorporation of BMPs for habitat protection, etc.) for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

1.2.1.27 Create legislation to re-instate incentives for citizens bringing their own shopping bag(s) to grocery stores in an effort to decrease the amount of plastic shopping bags in circulation.

1.2.1.28 Create incentives to implement dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

2 Direct Management of Natural Resources

2.1 Create new habitat or natural processes: *Creation of new habitat or natural processes for the benefit of fish and wildlife and recreational users.*

2.1.1 Habitat conversion: *Conversion of one type of habitat into another (e.g., creating bottomland forest from agricultural land, wetland creation) Note: Forest and wetland would be the appropriate broad habitat types to code for these two examples.*

2.1.1.1 Create high marsh habitat through impoundments and diking of low marsh areas that are less susceptible to breaching by storms and sea-level rise.

2.1.1.2 Utilize dredged materials to create marsh islands to provide nesting habitat for birds and marine turtles.

2.2 Dam and barrier removal: *Removal of barriers to maintain aquatic species populations and restore ecological functions in streams (e.g., dam or dike removal, notching of dams).*

2.2.1 Culvert work: *Replacement or repair of road culverts (e.g., installing larger culvert, eliminating perching).*

2.2.1.1 Replace existing barriers to wildlife movement with and/or install appropriately-sized systems to accommodate wildlife dispersal.

2.2.5 Obstruction removal: *Removal of other obstructions (e.g., beaver dams).*

2.2.5.1 Enhance fish SGCN habitats by removing obstructions to fish passage to benefit those species.

2.3 Fire management: *Use of fire to benefit fish and wildlife and their habitats.*

2.3.2 Fuel reduction: *Application of treatments to reduce the risk of high-severity wildfires and to manage changes in the ecological functions of forests (e.g., mechanical thinning).*

2.3.2.1 Prevent wildfires by reducing natural fuel (e.g., leaf litter).

Level 1	Level 2	Level 3	Level 4: NJ-specific Conservation Action Statements

2.3.3 Prescribed burning: *Application of fire in a knowledgeable manner to forest fuels on a specific land under selected weather conditions to accomplish predetermined, well-defined management objectives (e.g., burning an established native grass community to reduce or eliminate invading brush or exotic species).*

2.3.3.1 Evaluate different management techniques of prescribed burns that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

2.3.3.2 Conduct prescribed burning in Northern New Jersey forests to maintain and regenerate a mosaic of upland forest habitats.

2.3.3.3 Conduct prescribed burning to improve wildlife habitat.

2.4 Fish and wildlife habitat structures: *Installation of structures to benefit fish and wildlife and their habitats.*

2.4.2 Hibernacula: *Creation or improvement of overwintering sites.*

2.4.2.1 Investigate the need to stabilize important bat hibernacula to ensure structural soundness and install the necessary supports.

2.6 Hazard or infrastructure removal: *Removal of hazards or infrastructure to benefit fish and wildlife and their habitats.*

2.6.6 Shoreline armoring removal: *Removal of shoreline armoring to improve aquatic habitats (e.g., jetties, riprap).*

2.6.6.1 Remove shoreline armoring to reduce its impacts on aquatic habitats.

2.8 Invasive species control: *Control of invasive animal and plant species to maintain native species populations and restore ecological functions.*

2.8.0 Invasive species control strategies and implementation

2.8.0.1 Control invasive insect infestations by implementing BMP strategies through biological, chemical and/or mechanical means that will depress, or when appropriate, eradicate populations in a manner that avoids excessive harm to non-target species using BMPs to control infestations and limit their spread based on an inventory of invasive insect distribution and response to outbreaks.

2.8.0.2 Develop, implement, monitor and evaluate pest control/management strategies to reduce the impacts of over-abundant wildlife species (native and/or native , invasive species) on native vegetation and the degradation of habitats supporting SGCN. Over-abundant wildlife species include but are not limited to mute swans, Canada geese, beaver and white-tailed deer.

2.8.0.3 Work with NJ Invasive Species Strike Team to identify areas with and eradicate aquatic invasive species such as the Asian Swamp Eel, Northern Snakehead, and the Chinese pond mussel. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

Level 1	Level 2	Level 3	Level 4: NJ-specific Conservation Action Statements

2.8.0.5 Implement biologically safe and appropriate control/management strategies, and where appropriate, eradication strategies to reduce the impacts and/or limit the distribution of invasive and/or non-native plant species within or near aquatic systems using methods that will provide the most protection to the aquatic and riparian ecological system, and minimize disturbance to the soil and wildlife. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.8.0.6 Implement long-term management of invasive and/or non-native plants to help maintain functioning ecological systems and biological diversity, and to enhance travel corridors. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.9 Living shorelines: *Physical manipulation in shoreline areas to maintain fish and wildlife habitats and/or restore ecological functions.*

2.9.1 Beach renourishment: *Placement of sand onto beaches and employing other techniques for their renourishment.*

2.9.1.1 Implement best management practices for using mined sand or dredged material to improve habitat for wildlife, particularly for spawning horseshoe crabs and migrating shorebirds.

2.9.1.2 Coordinate the beneficial placement of dredge materials to create, enhance, and/or maintain colonial waterbird nesting, in particular along the Intra-Coastal Waterway.

2.9.1.3 Where beach renourishment projects are deemed necessary, implement such projects with a design to increase availability of nesting and foraging habitat for beach nesting birds.

2.9.1.4 Implement beach renourishment strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimizes harm to wildlife, particularly SGCN.

2.9.1.5 Expand the acreages and enhance the effective size of SGCN habitats by utilizing beach renourishment to restore adjacent, less optimal or unsuitable, habitats.

2.9.1.6 Reclaim degraded rare species habitats using beach renourishment, when appropriate, to restore habitat value for the documented/target SGCN.

2.9.1.7 Protect significant natural and/or unique communities by implementing best management practices for beach renourishment, when applicable.

2.9.1.8 Minimize habitat loss of critical coastal beach habitats that provide nesting, migrating, and wintering areas for birds and other coastal species by maintaining or enhancing these areas through beach renourishment.

2.9.1.9 Manage beaches to divert human activity away from staging areas for red knots and other migratory shorebirds during critical periods.

2.9.1.10 Repair beaches associated with marshes damaged by salt hay farm/dike abandonment and restore degraded sites for targeted SGCN species and their habitats.

2.9.1.11 Enhance critical migratory stopover beach habitats for songbirds, raptors, shorebirds, bats and invertebrates through beach renourishment and expand management to adjacent private lands to increase the effective size of the habitat.

2.9.1.12 Implement beach habitat management on state and other conservation lands to enhance food availability for migratory species (birds, bats, invertebrates).

2.9.1.13 Conduct beach renourishment to maintain, enhance and/or create feeding and roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

2.9.1.14 Implement best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated beach habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.9.1.15 Implement beach management strategies to benefit urban-associated SGCN.

Level 1	Level 2	Level 3	Level 4: NJ-specific Conservation Action Statements

2.9.1.16 Prevent or ameliorate near-term impacts of climate change throughout the State but in particular within the coastal and Delaware Bay areas by implementing habitat management strategies that will establish/improve habitat resilience, such as beach renourishment, that benefits wildlife inhabiting these areas.

2.9.2 Erosion control structures: *Installation of hard structures (e.g., seawall bulkhead) or living structures (e.g., greenwall systems) to control erosion.*

2.9.2.1 Install breakwaters in the form of living shorelines to reduce the impact of wave erosion while preserving the natural character of the site.

2.9.3 Sand dune restoration: *Application of techniques to restore sand dunes (e.g., fencing off sea-grass areas).*

2.9.3.1 Prevent or ameliorate near-term impacts of climate change throughout the State but in particular within the coastal and Delaware Bay areas by implementing habitat management strategies that will establish/improve habitat resilience, such as sand dune restoration, that benefits wildlife inhabiting these areas.

2.9.3.2 Implement sand dune restoration strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimizes harm to wildlife, particularly SGCN.

2.9.3.3 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through sand dune restoration.

2.9.3.4 Reclaim degraded rare species habitats using sand dune restoration needed to restore habitat value for the documented/target SGCN.

2.9.3.5 Protect significant natural and/or unique communities by implementing best management practices for sand dune restoration.

2.9.3.6 Minimize habitat loss of critical coastal dune habitats that provide nesting, migrating, and wintering areas for birds and other coastal species by maintaining or enhancing these areas through sand dune restoration.

2.9.3.7 Manage sand dunes to divert human activity away from staging areas for red knots and other migratory shorebirds during critical periods.

2.9.3.8 Implement sand dune restoration strategies to benefit urban-associated SGCN.

2.9.3.9 Enhance critical migratory stopover sand dune habitats for songbirds, raptors, shorebirds, bats and invertebrates through sand dune restoration and expand management to adjacent private lands to increase the effective size of the habitat.

2.9.3.10 Implement sand dune restoration strategies on state and other conservation lands to enhance food availability for migratory species (birds, bats, invertebrates).

2.9.3.11 Conduct sand dune restoration to maintain, enhance and/or create feeding and roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State and evaluate the effectiveness of such management.

2.9.3.12 Implement best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated sand dune habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10 Planting/seeding: *Planting or seeding to maintain fish and wildlife habitats and/or restore ecological functions.*

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

Level 1	Level 2	Level 3	**Level 4: NJ-specific Conservation Action Statements**

2.10.0.2 Improve the availability of prey/food resources through terrestrial and aquatic plantings and habitat restoration for SGCN populations, in particular for those populations thought to be limited due wholly or in part to a lack of (or contaminated) food resources, and for migratory species (birds, bats, invertebrates).

2.10.0.3 Restore and/or enhance habitats to benefit urban-associated SGCN.

2.10.0.4 Restore and/or enhance suitable travel corridors connecting conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.8 Protect significant natural and/or unique communities by implementing best management practices when conducting habitat restoration strategies.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.10 Minimize the loss of important habitats (e.g., coastal scrub-shrub and grassy habitats, high and low marsh habitats, etc.) that provide nesting, migrating, and wintering areas for SGCN birds and other coastal and marsh-dependent species through habitat restoration efforts.

2.10.0.11 Restore and/or enhance critical migratory terrestrial and aquatic habitats (e.g., beach, grasslands, forest, scrub-shrub, etc.) for songbirds, raptors, shorebirds, waterfowl, bats and invertebrates through habitat restoration efforts and expand habitat restoration to adjacent private lands to increase the effective size of the habitat.

2.10.0.12 Create and/or maintain scrub-shrub habitats through revegetation efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.10.0.13 Restore and/or enhance impoundments to provide suitable foraging and nesting habitat for SGCN species inhabiting them (e.g., bitterns, rails, ducks, turtles and some invertebrates).

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.15 Restore and/or enhance terrestrial and aquatic habitats proximate to but not adjacent to roads and other transportation corridors for terrestrial-bound SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.10.0.16 Reverse the trend of Native Widgeon grass invading former eelgrass bed habitats by actively restoring eelgrass in applicable areas.

2.10.0.17 Maintain, enhance and/or restore SGCN-inhabited/used freshwater wetlands through restoring submerged aquatic vegetation.

2.10.0.18 Implement a habitat improvement and restoration program to restore cold-water fish habitat, ecosystems and populations.

Level 1	Level 2	Level 3	Level 4: NJ-specific Conservation Action Statements

2.10.0.19 Provide woody debris within documented Tiger Salamander pools to benefit Tiger Salamanders and other associated vernal pool herpetofauna for shelter, egg-attachment and soil protection.

2.10.0.20 Expand breeding opportunities for obligate vernal pool breeders and related herpetofauna by creating vegetated buffers for dispersal from breeding pools in all directions, or as needed to establish the connectivity of metapopulations.

2.10.0.21 Restore and/or enhance understory habitats that suppress invasive species and provide critical resources and enhance sheltering, foraging, and nesting cover for wildlife.

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.10.0.23 Restore and/or enhance roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

2.10.0.24 Use NJ's CHANJ mapping and guidance to establish vegetation and enhance or create corridors between fragmented habitats with similar vegetation, slope, soils, structure, etc. to ensure vegetative integrity is maintained to allow wildlife to safely disperse, and corridors are buffered with natural habitats to minimize disturbance to wildlife within the corridors.

2.10.0.25 Enhance SGCN fish habitats through aquatic and riparian vegetation restoration.

2.10.0.26 Reestablish/restore historically important submerged aquatic vegetation beds in Delaware Bay tributaries to benefit SGCN waterfowl, waterbirds, terrapins, sea turtles and finfish.

2.10.1 Coral: *Application of techniques to reestablish coral reefs.*

2.10.1.1 Reestablish coral reefs to improve the availability of prey/food resources for SGCN whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources.

2.11 Vegetation management: *Physical manipulation of vegetation to maintain fish and wildlife habitats and/or restore ecological functions.*

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.11.0.3 Create suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats through vegetation management.

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through vegetation management.

2.11.0.6 Reclaim degraded rare species habitats by conducting vegetation management needed to restore habitat value for the documented/target SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.8 Maintain, enhance and/or restore biologically appropriate buffers for SGCN-inhabited/used freshwater wetlands through vegetation management.

Level 1	Level 2	Level 3	Level 4: NJ-specific Conservation Action Statements
			2.11.0.9 Minimize habitat loss of critical coastal habitats that provide nesting, migrating, and wintering areas for birds and other coastal species by maintaining or enhancing these areas through vegetation management.
			2.11.0.10 Enhance critical migratory stopover beach habitats for songbirds, raptors, shorebirds, bats and invertebrates through vegetation management and expand management to adjacent private lands to increase the effective size of the habitat.
			2.11.0.11 Implement vegetation management on state and other conservation lands to enhance food availability for migratory species (birds, bats, invertebrates).
			2.11.0.12 Conduct vegetation management to create feeding and roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.
			2.11.0.13 Implement best management practices (BMPs), protective strategies, and guidelines for vegetation management to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.
			2.11.0.14 Conduct vegetation management adjacent to roads for SGCN species whose behavior (i.e., dispersal across roads) *may* be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).
			2.11.0.15 Implement vegetation management to benefit urban-associated SGCN.
			2.11.0.16 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.
			2.11.0.17 Implement vegetation management strategies to improve the availability of prey/food resources for SGCN whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources.
			2.11.0.18 Implement forest management/silvicultural strategies that promote the development of new old-growth forests and/or minimize the loss of old-growth forest stands with large trees and within large, contiguous tracts.
			2.11.0.19 Implement forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN.
			2.11.0.20 Create and/or maintain scrub-shrub habitats through management efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.
			2.11.0.21 Minimize the degradation, alteration and/or changes in hydrology of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and subsequent disturbances to and behavioral changes of wildlife by maintaining or enhancing these areas and biologically appropriate buffers through habitat management and/or revegetation or restoration efforts.
			2.11.0.22 Minimize habitat loss of high and low marsh habitats that provide nesting, migrating and wintering areas for SGCN birds and other marsh-dependent SGCN by maintaining or enhancing these areas through habitat management and/or revegetation or restoration efforts.
			2.11.0.23 Implement appropriate habitat management actions in areas where natural disturbances, such as wildfire, have been precluded.
			2.11.0.24 Conduct vegetation management adjacent to aquatic habitats following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

Level 1	Level 2	Level 3	**Level 4: NJ-specific Conservation Action Statements**
			2.11.0.25 Conduct vegetation management along access roads following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.
			2.11.0.26 Conduct vegetation management along roadsides and medians, avoiding peak activity periods for wildlife, that enhances wildlife dispersal naturally and safely across roads and similar barriers to/between terrestrial and/or aquatic habitats.
			2.11.0.27 Conduct vegetation management for target shrub- or young forest-dependent SGCN following BMPs to minimize the risk of the establishment of invasive and non-native plants.
			2.11.0.28 Conduct vegetation management in agricultural areas following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.
			2.11.0.29 Conduct vegetation management on transportation and service corridors (i.e., rights-of-way) following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.
			2.11.0.30 Identify and prioritize areas where various management tools (such as increasing salinity through the management of water levels or chemical applications) may be effective in reducing phragmites within and restoring marsh habitat.
			2.11.0.31 In areas where vegetative communities are shifting due to fire suppression and controlled burns are not feasible, manage vegetation to improve wildlife habitat.
			2.11.0.32 Increase structural habitat diversity around and when feasible, within agricultural landscapes by managing vegetation for a variety of species, in particular, those farms that have removed scrub-shrub habitat and/or fragmented forests, and by implementing ecologically best practices (e.g., no-till farming, maintaining hedgerows, buffer set-asides, etc.).
			2.11.0.33 Increase structural habitat diversity by implementing long-term vegetation management to minimize the potential for the establishment of invasive and/or non-native plants that may outcompete native vegetation.
			2.11.0.34 Increase structural habitat diversity by managing residential, commercial and recreational areas' landscapes for a variety of species. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.
			2.11.0.35 Increase structural habitat diversity by managing vegetation adjacent to aquatic habitats in a manner that provides a buffer from runoff and erosion and a microclimate to stabilize seasonal temperatures to benefit a variety of aquatic and semi-aquatic species.
			2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.
			2.11.0.37 Increase structural habitat diversity by minimizing the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats which benefits wildlife.
			2.11.0.38 Increase structural habitat diversity in and around horse/livestock farms by managing vegetation for a variety of species, in particular, in and around farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).
			2.11.0.39 Increase structural habitat diversity in and around solar farms by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

Level 1	Level 2	Level 3	Level 4: NJ-specific Conservation Action Statements

2.11.0.40 Increase structural habitat diversity surrounding areas used for energy, mining, and transportation and service corridors by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides, and avoid managing habitat during the breeding seasons for ground-nesting birds, reptiles, amphibians and small mammals.

2.11.0.41 Increase structural habitat diversity through the implementation of a variety of vegetation management practices such as prescribed burns (either increasing or decreasing their frequency depending on the site and objective), plantings, etc. that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.42 Increase structural habitat diversity within wind farms for terrestrial bound and low-flying species and around wind farms for other wildlife by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.43 Manage forests to increase variation in age structure and composition using BMPs that promote and maintain functioning ecological forest-based systems and biological diversity.

2.11.0.44 Manage phragmites adjacent to coastal marshes of interest, in particular those that are within underdeveloped areas and are unprotected, through herbicide application and water management to improve resiliency of the marshes to sea level rise.

2.11.0.45 Regularly and/or rotationally create young forest habitat in targeted areas to maintain and regenerate a mosaic of upland forest habitats that will benefit shrub- and young forest-dependent species.

2.12 Water management: *Management of water to benefit fish and wildlife and their habitats.*

2.12.1 Ditch plugs: *Installation of earthen plugs into drainage ditches to restore wetlands.*

2.12.1.1 Implement best management practices (BMPs), protective strategies, and guidelines for ditch plugging to maintain and enhance healthy, resident and migratory SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.12.2 Diversion/headgate: *Installation or maintenance of structures to divert water.*

2.12.2.1 Prevent or ameliorate near-term impacts of climate change throughout the State but in particular within the coastal and Delaware Bay areas by implementing habitat management strategies that will establish/improve habitat resilience, such as using diversions, that benefits wildlife inhabiting these areas.

2.12.3 Drainage: *Removal of tile drains or drainage ditches to restore wetland hydrology.*

2.12.3.1 Remove drainage ditches to benefit urban-associated SGCN.

2.12.3.2 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) such as removing drainage ditches to restore natural stream flows and wetlands, that benefit wildlife inhabiting these areas.

2.12.3.3 Remove tile drains and drainage ditches to improve wetland hydrology and restore natural stream flows during appropriate times to avoid sensitive periods (e.g., nesting, denning, roosting) and minimizes harm to wildlife, particularly SGCN.

Level 1	Level 2	Level 3	Level 4: NJ-specific Conservation Action Statements

2.12.3.4 Expand the acreages and enhance the effective size of SGCN habitats by reclaiming/restoring adjacent, degraded habitats by removing tile drains and drainage ditches.

2.12.3.5 Remove drainage ditches adjacent to roads to decrease the attraction for amphibians, reptiles and small mammals, and thereby minimizing road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.12.3.6 Protect significant natural and/or unique communities by and when removing tile drains and drainage ditches.

2.12.3.7 Minimize habitat loss of critical coastal habitats that provide nesting, migrating, and wintering areas for birds and other coastal species by maintaining or enhancing these areas by removing drainage ditches.

2.12.3.8 Enhance critical migratory stopover beach habitats for songbirds, raptors, shorebirds, bats and invertebrates by removing drainage ditches and expanding management to adjacent private lands to increase the effective size of the habitat.

2.12.3.9 Implement drain removal on state and other conservation lands to enhance food availability for migratory species (birds, bats, invertebrates).

2.12.3.10 Use tile drain and drainage ditch removal to create feeding and roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

2.12.3.11 Implement best management practices (BMPs), protective strategies, and guidelines when removing tile drains and drainage ditches to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.12.5 Spring development: *Application of techniques to improve the flow, quantity and yield of water from a natural spring.*

2.12.5.1 Implement a habitat improvement and restoration program to restore cold-water fish habitat, ecosystems and populations.

2.12.6 Tide gate: *Installation or maintenance of structures to increase the hydro-period and water depth of a wetland.*

2.12.6.1 Prevent or ameliorate near-term impacts of climate change throughout the State but in particular within the coastal and Delaware Bay areas by implementing habitat management strategies that will establish/improve habitat resilience, such as tide gates, that benefits wildlife inhabiting these areas.

2.12.7 Waterfowl impoundment maintenance: *Maintenance of impoundments for waterfowl habitat (e.g., renovation of impoundment dikes).*

2.12.7.1 Manage impoundments to benefit SGCN species inhabiting them (e.g., bitterns, rails, ducks, turtles and some invertebrates).

2.12.7.2 Use impoundment management to create feeding and roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

2.12.7.3 Implement best management practices (BMPs), protective strategies, and guidelines for impoundment management to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.12.7.4 Implement impoundment management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimizes harm to wildlife, particularly SGCN.

2.12.7.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through impoundment management.

Level 1	Level 2	Level 3	Level 4: NJ-specific Conservation Action Statements

2.12.7.6 Reclaim degraded rare species habitats through impoundment management needed to restore habitat value for the documented/target SGCN.

2.12.7.7 Protect significant natural and/or unique communities by implementing best management practices for impoundment management.

2.12.7.8 Repair impoundments damaged by salt hay farm/dike abandonment and conduct restoration of degraded sites for targeted SGCN species and their habitats.

2.12.7.9 Minimize habitat loss of critical coastal habitats in Delaware Bay that provide nesting, migrating, and wintering areas for birds and other coastal species by maintaining or enhancing these areas through impoundment management.

2.12.7.10 Enhance critical migratory stopover beach habitats for songbirds, raptors, shorebirds, bats and invertebrates through impoundment management and expand management to adjacent private lands to increase the effective size of the habitat.

2.12.7.11 Restore existing salt hay farm areas by repairing breaches in impoundments to create habitat for high marsh nesting species and waterfowl.

2.12.7.12 Implement impoundment management to benefit urban-associated SGCN.

2.12.7.13 Manage impoundments adjacent to roads for SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., marsh birds, amphibians, turtles, small mammals).

2.12.7.14 Prevent or ameliorate near-term impacts of climate change throughout the State but in particular within the coastal and Delaware Bay areas by implementing habitat management strategies that will establish/improve habitat resilience, such as impoundment management, that benefits wildlife inhabiting these areas.

2.12.7.15 Implement impoundment management on state and other conservation lands to enhance food availability for migratory species (birds, bats, invertebrates).

2.12.8 Watering facilities: *Installation or maintenance of structures to collect and store water for the benefit of wildlife (e.g., water holes, guzzlers, wells).*

2.12.8.1 Install water control structures to reduce the impact of salt water intrusion to particularly vulnerable high marsh habitats.

2.12.8.2 Manage water levels in impoundments to improve coastal marsh habitat availability to wildlife and improve resiliency of the marshes to sea level rise.

2.13 Wildlife damage management: *Assessment and management of damage from nuisance native fish and wildlife. Includes control of predators by biological, chemical or mechanical means to maintain populations of species at risk and restore ecological functions (e.g., gull or cormorant control, nest exclusion devices, cave gating) Note: Limited eligibility for funding through WSFR grant programs.*

2.13.0 Nuisance fish and wildlife damage

2.13.0.1 Investigate the impacts of mosquito control methods on predator SGCN (bats, insectivorous birds). Develop, implement and evaluate the effectiveness of mosquito control-BMPs designed to avoid depletion or contamination of SGCN's insect prey base and drinking sources with pyrethroids, organophosphates, or other chemicals.

2.13.0.2 Develop, implement and evaluate the effectiveness of BMPs for mosquito control methods that may produce benefits for coastal marsh dependent SGCN wildlife, including but not limited to high-marsh nesting birds and migrating shorebirds and landbirds.

2.13.0.3 Investigate alternative saltmarsh mosquito control methods that may produce benefits for coastal marsh dependent SGCN wildlife, including but not limited to high-marsh nesting birds and migrating shorebirds and landbirds.

2.13.0.4 Investigate the effects of mosquito control methods on freshwater aquatic and semi-aquatic SGCN including but not limited to, amphibian, fish, dragonfly, and damselfly populations.

Level 1	Level 2	Level 3	Level 4: NJ-specific Conservation Action Statements

2.13.0.5 Investigate the impacts of human-subsidized and/or naturally occurring predator species on SGCN to assess the need for integrated wildlife damage management techniques (e.g., predator exclosures, fish blockages, electric fence, culls) and/or policy changes on state land management that minimize the impacts of human-subsidized predators.

2.13.0.6 Develop, implement and evaluate the effectiveness of predator-control techniques aimed at improving SGCN populations and methods to minimize the impact of those species carrying parasites or diseases that may impact SGCN (e.g., raccoon roundworm kills Allegheny woodrat).

2.13.0.7 Develop, implement, monitor and evaluate management strategies to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

2.13.0.8 Implement and assess management strategies to control and reduce the impacts of detrimental species and diseases that pose threats to native wildlife or communities.

2.14 Wildlife disease management: *Assessment and management of wildlife disease situations. Includes control or treatment of diseased animals to maintain populations of species at risk and restore ecological functions (e.g., chronic wasting disease, brucellosis, tuberculosis, plague management activities).*

2.14.0 Wildlife disease strategy development and investigation

2.14.0.1 Investigate diseases/pathogens impacting SGCN and/or their habitats.

2.14.0.2 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

2.14.0.3 Protect SGCN from exotic pathogen introduction or incident through implementation of a "rapid response plan"; DFW to give priority attention to these species in planning and/or implementing a response.

2.14.0.4 Conduct long-term monitoring of diseases in vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts.

2.14.0.5 Assess the impacts of diseases on the life cycles of wildlife.

2.14.0.6 Distribute antihelminthic drugs targeting raccoon roundworm in raccoons proximal to Allegheny woodrat populations and/or implement a raccoon control strategy.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

Level 1	Level 2	Level 3	**Level 4: NJ-specific Conservation Action Statements**

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.6 Conduct long-term studies on resident and migratory SGCN to determine if there are changes to the populations' demography (productivity, survival, dispersal) and/or to their critical and/or supporting habitats (i.e., diminishing in value, acreage or connectivity, etc.), in particular changes that would not maintain SGCN at viable levels for species populations. Update data and GIS maps; provide updated information to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.9 Identify SGCN (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources, and compile/collect and evaluate data/information regarding potential management strategies to improve the availability of such SGCN's food resources.

3.0.0.10 Conduct long-term studies to evaluate the effectiveness of management strategies implemented to enhance food/prey availability for SGCN [whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources] through studies that investigate the populations and health of the food resources as well as the target SGCN. Revise management strategies as needed and continue to monitor the effectiveness of the efforts.

3.0.0.11 Develop, implement and evaluate the effectiveness of town plans that avoid impacts to SGCN species and their habitats.

3.0.0.12 Compile available life history information on urban-associated SGCN (e.g., predators, levels of nest/young depredation, breeding longevity and reproductive effort over time, preferred nesting/reproductive requirements, fidelity to breeding and wintering sites, comprehensive assessment of migration routes and destinations) for future development of management strategies to benefit such species.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

Level 1	Level 2	Level 3	Level 4: NJ-specific Conservation Action Statements

3.0.0.14 Identify areas with invasive, aquatic plants and animals and collect a detailed baseline assessment of the species' status and distribution. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort. Researchers and contractors performing Forest Stewardship Inventories and/or Plans on state lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.0.0.15 Conduct long-term monitoring of areas identified as having invasive, aquatic plants and animals to track the species' status/progress over time with or without the implementation of management strategies. Areas without management strategies should be assessed and prioritized for management/control. Areas where management strategies are being implemented should include an assessment of the management effort and identify/recommend and implement necessary changes to improve its success. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort.

3.0.0.16 Develop a baseline status (through studies and assessments, review of available data, enlistment of species experts, etc.) of marsh- and beach-dependent SGCN (and their habitats) whose populations may be impaired due to habitat degradation as a result of salt hay farm/dike abandonment.

3.0.0.17 Conduct long-term monitoring of marsh- and beach-dependent SGCN (and their habitats) to evaluate the effectiveness of the management strategies implemented to repair degraded marshes and beaches damaged by salt hay farm/dike abandonment within all bay shore areas.

3.0.0.18 Develop, implement and evaluate the effectiveness (through research and long-term monitoring) of engineering standards that embrace both shore protection/resiliency and habitat creation for shorebirds, horseshoe crabs and other coastal species along the Atlantic and Delaware Bay coasts that minimize horseshoe crab impingement and damage to beach habitat from residential and commercial construction.

3.0.0.19 Identify the presence and status (e.g., functioning, structure, slated for removal, etc.) of existing dams and culverts within and/or that may impact SGCN and their habitats, and create a database that includes a GIS component identifying the locations of such structures and their status. Share this information with appropriate organizations and/or agencies evaluating the benefits and risks of such structures on SGCN and their habitats.

3.0.0.20 Once baseline data identifying and describing the status of existing dams and culverts have been gathered, conduct evaluations at a variety of sites to determine whether the benefits of culvert and dam creation or removal outweigh the risks to SGCN species and their habitats, and if other variables/conditions specific to individual sites/locations result in a different outcome. Identify and target appropriate dams and culverts for removal and/or reconstruction to minimize harm to SGCN species and their habitats.

3.0.0.21 Conduct long-term monitoring to determine the impacts of the fish and shellfish aquaculture industries on focal and non-focal SGCN and their habitats (i.e., NJ bays, estuaries, ocean areas). Assess the success of management actions implemented to minimize these impacts and make specific recommendations to the NJ DEP regarding how such management efforts may be improved to minimize harm to wildlife and their habitats.

3.0.0.22 Develop, implement and evaluate the success of a habitat improvement and restoration program to restore cold-water fish habitat, ecosystems and populations.

3.0.0.23 Identify (through wildlife and aquatic system surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and research water quality parameters for all [types of] aquatic systems for various SGCN populations.

3.0.0.24 Identify (through aerial and topographic maps), and confirm through field surveys, potential vernal pools using standard protocols. Provide confirmed vernal pool locations (and when possible, a description of the pools condition) and species' presence data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

Level 1	Level 2	Level 3	Level 4: NJ-specific Conservation Action Statements

3.0.0.25 Identify pathways of migratory SGCN in the Atlantic Coastal and Marine Regions (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and use the data to help evaluate the potential short- and long-term impacts of wind turbines, radio towers, utility guy lines, and other tall coastal structures on migratory populations.

3.0.0.26 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species including objectives and guidance pertaining to and the condition/status of critical and supporting habitats.

3.0.0.27 Evaluate the effectiveness of strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals through research and monitoring. Develop and provide NJ DEP and other appropriate governing agencies/commissions a summary of findings and recommendations to improve such efforts.

3.0.0.28 Evaluate best management practices for using mined sand or dredged material to improve habitat for wildlife, particularly for spawning horseshoe crabs and migrating shorebirds.

3.0.0.29 Conduct long-term monitoring of sensitive marine species habitats and migration and/or spawning areas to determine their continued use or changes as a result of habitat shifts or alterations that may warrant further management actions.

3.0.0.30 Conduct research to investigate the feasibility of managing and/or creating roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

3.0.0.31 Conduct short- and long-term studies (e.g., wildlife surveys and habitat assessments) to evaluate the effectiveness of vegetation management efforts to maintain, enhance and/or create roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

3.2 Research, survey or monitoring - fish and wildlife populations: *Collection and analysis of data as part of research, survey or monitoring primarily focused on fish and wildlife populations Note: includes compilation, management, synthesis, analysis and reporting of spatial and non-spatial data Note: Code work on fish and wildlife diseases to Wildlife Disease Management within Direct Management of Natural Resources.*

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.2 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.0.3 Survey for and monitor populations of freshwater aquatic focal SGCN to assess the populations' demography, trends, condition, distribution, etc.

3.2.0.4 Conduct long-term monitoring of the impacts of contaminants to vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.2.0.5 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

3.2.0.6 Develop, implement and conduct studies to evaluate the effectiveness of methods implemented to reduce road mortality of wildlife (e.g. wildlife underpasses, road closures).

Level 1	Level 2	Level 3	**Level 4: NJ-specific Conservation Action Statements**

3.2.0.7 Track (via a database that includes a GIS component) and research problematic species and diseases to determine their distribution, impacts on SGCN wildlife/wildlife communities, and develop potential control measures.

3.2.0.8 Implement and conduct long-term monitoring of control measures aimed at minimizing the impacts of problematic species and/or diseases to evaluate the effectiveness of such efforts and to identify and incorporate additional strategies as appropriate.

3.2.0.9 Maintain an inventory of invasive insect distribution and where they exist, conduct long-term monitoring of habitat conditions to assist in developing strategies to combat the impacts to SGCN habitats. Report potential infestations to NJ DEP.

3.2.0.10 Evaluate the effectiveness of sanitation/decontamination protocols in minimizing the transference of wildlife diseases and invasive plant species.

3.2.0.11 Investigate the impacts of ORV use as a mechanism to spread wildlife diseases and invasive plant species to native wildlife and habitats. Integrate this information when mapping undeveloped roads and trails to identify potentially sensitive areas in northern NJ forests.

3.2.0.12 Investigate the impacts of ORV use and ORV-created noise on terrestrial and aquatic wildlife behavior and the impact of direct mortality from vehicle strikes. Integrate this information when mapping undeveloped roads and trails to identify potentially sensitive areas in northern NJ forests.

3.2.0.13 Continue the research and studies undertaken by the State's Shad and River Herring/Alewife Technical Working Group regarding an assessment to determine if the herring should be listed as a "stock in the fishery."

3.2.0.14 Identify spawning areas for species such as Atlantic and Shortnose sturgeon, Alewife, and Blueback Herring, and document shifts of these areas over time. Assess their reproductive success over time, including fecundity, early life stages and juvenile success, etc.

3.2.0.15 Identify and compile information regarding critical time periods in which freshwater SGCN fish are vulnerable (e.g., spawning periods) using literature searches, review of available data, enlistment of species experts, etc.).

3.2.0.16 Conduct long-term monitoring to evaluate the success of marine conservation zone designations on marine SGCN.

3.2.0.17 Conduct monitoring at constructed wind farms (within or outside of NJ) to assess the impacts on migratory species (birds, bats, insects) and determine if NJ's land use planning efforts and/or smart-growth plans need to be revised.

3.2.0.18 Conduct baseline surveys/inventories to better understand the distribution of fish and invertebrate (including freshwater mussels) populations.

3.2.0.19 Develop, implement and evaluate aquaculture practices in coastal areas that are compatible with the recovery of SGCNs and industry needs.

3.2.0.20 Evaluate the effectiveness of BMPs for mosquito control methods that may produce benefits for coastal marsh dependent SGCN wildlife, including but not limited to high-marsh nesting birds and migrating shorebirds and landbirds.

3.2.0.21 Investigate the effects of mosquito control methods on freshwater aquatic and semi-aquatic SGCN including but not limited to, amphibian, fish, dragonfly, and damselfly populations.

3.2.0.22 Evaluate the effectiveness of predator-control techniques aimed at improving SGCN populations and methods to minimize the impact of those species carrying parasites or diseases that may impact SGCN (e.g., raccoon roundworm kills Allegheny woodrat).

3.2.0.23 Conduct long-term monitoring to evaluate the accuracy of and make necessary changes to a GIS predictive model of right whale migration routes off the NJ coast.

3.2.0.24 Develop, implement and evaluate the effectiveness of BMPs for lighting of/on tall structures that minimize harm to and/or disorient wildlife, in particular but not limited to migratory birds, bats and invertebrates. Implement BMPs into state, county and local permitting processes.

Level 1	Level 2	Level 3	Level 4: NJ-specific Conservation Action Statements

3.2.0.25 Conduct short- and long-term evaluations of structural stabilization strategies implemented at bat hibernacula and identify needed improvements to ensure structural soundness and of the potential impacts on bat hibernacula (i.e., the bats and internal conditions) when hibernacula are gated.

3.2.0.26 Develop, implement and evaluate efforts to remove horseshoe crab impingement hazards, and provide recommendations of potential improvements, if warranted.

3.2.1 Abundance determination: *Determination of relative abundance or estimation of size of fish and wildlife populations (e.g., adult population estimate, juvenile relative abundance).*

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.2 Age, size and sex structure: *Determination of age, size or sex structure of fish and wildlife populations (e.g., age and growth, length frequency, sex ratio).*

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.3 Baseline inventory: *Baseline survey and inventory to understand distribution of fish and wildlife populations.*

3.2.3.1 Identify the distribution of whales (particularly right whale) during seasonal migrations. Methods include but are not limited to: a) Conduct surveys in shipping lane vicinities and along the coast during whale migration to determine the seasonal distribution, b) Develop a predictive GIS model (based on available species occurrence information and habitat data) to predict right whale migration routes off the NJ coast, and c) Identify whale distribution and right whale migration routes through the participation in the East Coast's Sightings Advisory System for mariners.

3.2.3.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) suitable areas for marine conservation zone designation and promote policies and regulations that support the designation of such areas.

3.2.3.3 Develop a database of the distribution of seabird species (near-shore migrants and pelagic birds).

3.2.3.4 Establish population estimates and trends for all managed fish species.

3.2.3.5 Investigate and develop strategies to reduce "by-catch" of SGCN and other non-target species. Present findings and strategies to NJ DEP and conservation organizations for review and possible implementation. Develop a database documenting by-catch for use in management planning decisions.

3.2.3.6 Investigate the feasibility and potential for success of conducting genetic rescue through translocation and/or reintroduction of animals into suitable habitat that was historically occupied to increase genetic diversity and reconnect isolated populations. Methods of investigation should include, but are not limited to, thorough literature reviews, expert opinions, identifying potential pitfalls (e.g., species' fidelity to their range or critical areas), and an examination of historic and current SGCN population distribution and suitable habitat availability.

3.2.3.7 Identify roads or portions of roads, paved or unimproved (through site surveys, land use/land cover assessments and analyses, review of available data, enlistment of species experts, etc.) with high incidences of road mortality and/or presence of snakes, turtles, medium-sized and large mammals. Conduct assessments of the roads and incorporate information into a database that includes descriptions (e.g., qualifiers to help prioritize the roads' risk to wildlife) and a GIS component of the locations of such areas. Share this information with appropriate organizations and/or agencies working to implement measures (e.g., wildlife passages, road closures) to minimize the risk to these species.

Level 1	Level 2	Level 3	Level 4: NJ-specific Conservation Action Statements

3.2.3.8 Investigate the need to stabilize important bat hibernacula (e.g., structural soundness) and install the necessary supports.

3.2.3.9 Investigate hazardous environmental issues that may impact grassland invertebrates.

3.2.4 Food habits: *Studies on food habits of fish and wildlife species or their utilization as prey.*

3.2.4.1 Monitor and investigate the populations and health of SGCN prey/food resources for those SGCN whose populations are thought to be limited due wholly or in part to a lack of food resources or toxins in food resources.

3.2.5 Genetics: *Genetics studies of fish and wildlife populations (e.g., population connectivity, hybridization).*

3.2.5.1 Investigate the feasibility and potential for success of conducting genetic rescue through translocation and/or reintroduction of animals into suitable habitat that was historically occupied to increase genetic diversity and reconnect isolated populations. Methods of investigation should include, but are not limited to, thorough literature reviews, expert opinions, identifying potential pitfalls (e.g., species' fidelity to their range or critical areas), and an examination of historic and current SGCN population distribution and suitable habitat availability.

3.2.7 Population assessment: *Assessments of biological information to determine status of fish and wildlife populations (e.g., population viability analysis, fisheries stock assessment).*

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.3 Research, survey or monitoring - habitat: *Collection and analysis of data as part of research, survey or monitoring primarily focused on fish and wildlife habitats Note: includes compilation, management, synthesis, analysis and reporting of spatial and non-spatial data.*

3.3.1 Baseline inventory: *Baseline survey and inventory to understand distribution of fish and wildlife habitat quality and quantity (e.g., wetland mapping).*

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.3 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) remaining high and low marsh habitats with natural buffers and stable water levels that provide suitable habitat for SGCN and marsh habitats that would benefit from restoration. Conduct research to assess their condition for nesting, migrating and wintering birds.

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

Level 1	Level 2	Level 3	Level 4: NJ-specific Conservation Action Statements
			3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.
			3.3.1.6 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) that could, through revegetation and/or enhancement efforts, become suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN.
			3.3.1.7 Map and prioritize existing and potential areas for early succession forest management. Share the results with state, county and municipal planners.
			3.3.1.8 Assess the availability and suitability of forest habitats for SGCN species (particularly reptiles and amphibians, birds, pollinators, and tiger beetles) in southern forests since Superstorm Sandy.
			3.3.1.9 Inventory forests throughout northern New Jersey to develop a baseline characterization of the structure and composition of habitats and identify deficient forest habitat types.
			3.3.1.10 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and document fish SGCN habitats by plotting their distributions in GIS and submitting the data to the State for integration into the DEP's Biotics database.
			3.3.1.11 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the quality and importance of areas with submerged aquatic vegetation to benefit waterfowl, finfish, and shellfish species.
			3.3.1.12 Conduct an initial assessment of and document the availability and suitability of intact, preserved forest blocks containing vernal pools within the possible range of Eastern Tiger Salamander, which appear under-represented on a landscape scale. Incorporate findings into a database that includes descriptions and qualifiers of the habitats, and a GIS component of the locations of such areas. Share this information with appropriate organizations and/or agencies working to implement habitat restoration and enhancement strategies to provide opportunities for this salamander to disperse and expand its current range.
			3.3.1.13 Conduct wildlife surveys to confirm or reconfirm locations with suitable hydrologic conditions for tiger salamanders and associated vernal pool herpetofauna.
			3.3.1.14 Compile information (obtained through literature reviews, communication with other States along the Atlantic coast, academia, etc.) regarding the impacts of above water operation of wind turbines on migratory marine birds and bats. Provide data to appropriate governing agencies and/or State commissions for integration into permitting review processes.
			3.3.1.15 Conduct a literature review to determine the potential impacts of underwater vibrational noise on marine mammals, sea turtles and fishes emanating from offshore wind turbines during routine operations.
			3.3.1.16 Gather "best information" for spatial modeling and update/create a current model/depiction of anticipated habitat shifts from sea-level rise, flooding, etc.
			3.3.1.17 Identify and map undeveloped roads and trails in all conserved forests, and create a database of locations. Integrate information regarding potentially sensitive areas.
			3.3.1.18 Conduct an assessment using available data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels.
			3.3.1.19 Identify and codify legal ORV access areas on state (and if appropriate, other conserved) lands. Provide GIS mapping to the landowner for potential use in directing such recreational activities.

Level 1	Level 2	Level 3	**Level 4: NJ-specific Conservation Action Statements**

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.1.21 Conduct comprehensive baseline surveys of all marsh islands; surveys to include, but are not limited to, documented elevations, and assessments of the habitat's current condition and vulnerability of dependent SGCN species in relation to the increased inundation rate.

3.3.1.22 Identify, assess and prioritize marsh habitats for restoration where various management tools (such as increasing salinity through the management of water levels or chemical applications) may be effective in reducing the presence of phragmites.

3.3.1.23 Identify areas (through surveys/studies, predictive modeling, review of available data, enlistment of habitat management and/or species experts, etc.) where the State can allow coastal marsh migration due to sea level rise, and target these areas for land acquisition and/or land management to accommodate this transition. Targeted areas should include underdeveloped areas adjacent to unprotected coastal marshes.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.1.25 Compile an inventory of all horseshoe crab impingement hazards and share with permitting agencies, and the fisheries organizations and industry.

3.3.1.26 Survey all historic locations and unsurveyed suitable habitats to identify populations of freshwater aquatic focal species.

3.3.1.27 Develop a matrix that lists every commercial and recreational fishery and aquaculture facility that operates in state waters and for each fishery listed, provide details regarding their fishing seasons, gear descriptions, locations and number of fishers. Add a GIS component to overlay species of concern and sensitive areas.

3.3.1.28 Identify key habitats for the potential allowance of natural coastal processes without interfering through shoreline stabilization, etc. and evaluate the risks and benefits if coastal migration was permitted to occur naturally. Create a GIS map of the identified areas; provide the assessment and mapping to local towns and other appropriate governing agencies.

3.3.1.29 Identify coastal wildlife habitats unimpacted by development and/or at greatest risk of habitat loss to help guide enlightened coastal stabilization efforts (i.e., use of soft stabilization) to reduce the impacts on wildlife and their habitats.

3.3.1.30 Using available data, model a comprehensive Marine Submerged Aquatic Vegetation Mapping project (similar to the Statewide freshwater wetlands mapping project) of sufficient quality and integrity that it could support the NJ DEP's coastal regulatory programs. Continue to conduct surveys to gather additional data to test and improve the model.

3.3.2 Monitoring: *On-going monitoring of fish and wildlife habitat quality and quantity (e.g., annual early successional habitat survey, artificial reef condition).*

3.3.2.1 Evaluate the effectiveness of forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

Level 1	Level 2	Level 3	**Level 4: NJ-specific Conservation Action Statements**

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.4 Protect water quality and aquatic-dependent species by appropriately designating Category 1 waters and enforcing protective regulations. Seek appropriate classifications for stream segments based on Endangered and Threatened Status and/or the Index of Biotic Integrity (IBI) results that do not fulfill Category One requirements.

3.3.2.5 Conduct long-term monitoring of water quality of SGCN aquatic habitats (and aquatic systems feeding into those habitats) to evaluate protection and management efforts to reduce, if not eliminate, chemical contamination, siltation, eutrophication, and other forms of pollution/contamination of aquatic systems.

3.3.2.6 Investigate the effectiveness and potential impacts of marsh management techniques by studying the effects of Open Marsh Water Management on wildlife species, in particular high marsh nesting birds and waterfowl. Evaluate best management practices as appropriate.

3.3.2.7 Conduct studies on land use practices such as ditching, impounding, dredging, open marsh water management, burning, and marsh restoration to evaluate the effectiveness and potential impacts on marsh-dependent SGCN.

3.3.2.8 Evaluate the effectiveness of current prescribed burning practices on Pinelands dependent species.

3.3.2.9 Investigate the effectiveness of various silviculture techniques for enhancing forests for forest-dependent SGCN.

3.3.2.10 Evaluate the efficacy and success of different management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.3.2.11 Evaluate and compare the effectiveness of delayed mowing of warm season grass fields versus cool season hay fields to benefit grassland-dependent species.

3.3.2.12 Evaluate and compare the effectiveness of different management techniques (e.g., prescribed burning, mowing, brush-hogging, etc.) for maintaining suitable habitat for grassland-dependent species and species dependent upon early successional habitats.

3.3.2.13 Evaluate the effectiveness of management strategies (e.g., timing restrictions for mowing, cooperative agreements with utility companies for maintenance of rights-of-ways) that maintain and enhance large existing areas of grassland in perpetuity. Focus on habitat patches that can be managed to enhance the total size of suitable grassland habitat and create interspersed early-successional habitat.

3.3.2.14 Research and evaluate the effectiveness of water quality management practices on water-dependent and semi-dependent SGCN, particularly those practices associated with permitting or mitigation actions.

3.3.2.15 Investigate the effectiveness of management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

Level 1	Level 2	Level 3	Level 4: NJ-specific Conservation Action Statements

3.3.2.17 Conduct long-term habitat monitoring to determine the continued availability and suitability of intact, preserved forest blocks containing vernal pools within the possible range of Eastern Tiger Salamander. Update the database (to be developed during baseline assessments) regarding the forests' and vernal pools' conditions. Share this information with appropriate organizations and/or agencies working to implement habitat restoration and enhancement strategies to provide opportunities for this salamander to disperse and expand its current range.

3.3.2.18 Conduct long-term monitoring of and wildlife surveys at locations with suitable hydrologic conditions for Eastern Tiger Salamanders and associated vernal pool herpetofauna.

3.3.2.19 Once baseline data on the marsh islands' and associated SGCN species' vulnerability to inundation is completed, continue to conduct long-term monitoring the islands to determine sustainability for wildlife dependent on these areas.

3.3.2.20 Once a system is developed for reporting and qualifying new locations of invasive species, develop, implement and monitor/evaluate invasive species removal strategies at identified locations. Priority should be given to those areas critical to SGCN and/or contain unique and/or rare plant communities supporting SGCN and/or other fish/wildlife species.

3.3.2.21 Develop, implement and evaluate the effectiveness of management strategies use to restore marsh habitat (e.g., phragmites reduction).

3.3.2.22 Conduct short- and long-term monitoring of the current natural processes affecting sediment transport along the coast. Share findings with organizations/agencies attempting to design beach nourishment projects in a manner that will be beneficial to wildlife.

3.3.2.23 Conduct long-term monitoring of marine submerged aquatic vegetation and update the Marine Submerged Aquatic Vegetation Mapping [to be developed under baseline activities] to provide the NJ DEP's coastal regulatory programs with the most current data.

3.3.2.24 Conduct regular inventories of forests throughout northern New Jersey to characterize the changing structure and composition of habitats and monitor forest conditions.

3.5 Techniques development: *Research and development of techniques important for the conservation and management of fish and wildlife.*

3.5.1 Artificial propagation studies: *Research on artificial propagation of fish and wildlife (e.g., nutrition studies, culture methods).*

3.5.1.1 Conduct studies to evaluate the impacts (beneficial and detrimental) of aquaculture on migratory shorebirds, waterfowl, finfish, shellfish and other SGCN and their habitats, including evaluation of the relative effects of location and aquaculture techniques.

3.5.1.2 Develop and conduct studies that evaluate relative efficacy and feasibility of management actions designed to minimize adverse impacts and enhance beneficial effects.

3.5.3 Habitat restoration methods: *Development or improvement of methods to restore habitats and natural processes (e.g., evaluations of water level fluctuations).*

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.2 Develop management strategies to improve the availability of prey/food resources for SGCN whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources. Monitor and investigate the management strategies over time to determine success and/or the need to revise methods.

3.5.3.3 Develop/improve management techniques that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.4 Modify best management practices of Open Marsh Water Management based on evaluation of the effectiveness and potential impacts of marsh management techniques on wildlife species, in particular high marsh nesting birds and waterfowl.

3.5.3.5 Develop best management practices for using mined sand or dredged material to improve habitat for wildlife, particularly for spawning horseshoe crabs and migrating shorebirds.

3.5.3.6 Develop/improve management strategies to repair marshes and associated beaches damaged by salt hay farm/dike abandonment for all bay shore areas currently degraded.

Level 1	Level 2	Level 3	**Level 4: NJ-specific Conservation Action Statements**

3.5.3.7 Develop/improve forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

3.5.3.8 Develop best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5.3.9 Develop strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

3.5.3.10 Develop a habitat improvement and restoration program to restore cold-water fish habitat.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.12 Develop management actions to minimize the documented adverse impacts and reduce risks of potential adverse impacts of aquaculture on migratory shorebirds and other SGCN, including waterfowl, finfish, and shellfish and their habitats.

3.5.3.13 Developing engineering standards that embrace both shore protection/resiliency and habitat creation for shorebirds, horseshoe crabs and other coastal species along the Atlantic and Delaware Bay coasts.

3.5.3.14 Develop aquaculture practices in the Delaware Bay that are compatible with the recovery of SGCN.

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.3.16 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.3.17 Investigate and improve marsh management techniques to benefit critical wildlife species, in particular high marsh nesting birds and waterfowl.

3.5.3.18 Develop recommendations to improve methods on land use practices such as ditching, impounding, dredging, open marsh water management, burning, and marsh restoration based on potential impacts on marsh-dependent SGCN.

3.5.3.19 Work with foresters to develop prescribed burning practices for Pinelands dependent species that increase or maintain habitat quality for these species in the Pinelands.

3.5.3.20 Develop guidance on various silviculture techniques for enhancing forests for forest-dependent SGCN.

3.5.3.21 Develop management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.22 Identify (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) and modify management strategies (e.g., timing restrictions for mowing, cooperative agreements with utility companies for maintenance of rights-of-ways), based on research, that maintain and enhance large existing areas of grassland in perpetuity.

3.5.3.23 Revise water quality management practices based on research on water-dependent and semi-dependent SGCN, particularly when associated with permitting or mitigation actions.

Level 1	Level 2	Level 3	Level 4: NJ-specific Conservation Action Statements

3.5.3.24 Based on research, modify management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.3.26 Amend management strategies of gating bat hibernacula and/or installing additional supports for structural soundness based on the effectiveness and potential impacts on bat hibernacula (bats and internal conditions).

3.5.3.27 Conduct an assessment and develop a location list of available equipment for boom deployment during oil spills.

3.5.3.28 Conduct baseline surveys to determine areas in Barnegat and Great bays appropriate for eelgrass restoration. Develop necessary techniques to implement restoration efforts.

3.5.3.29 Explore the use of alternative vegetation (i.e., commodity crops) to address agriculture concerns.

3.5.4 Fish and wildlife research, survey and management techniques: *Development or improvement of research techniques or management tools (e.g., tag retention studies, sampling device improvements, testing of animal control devices).*

3.5.4.1 Develop studies to evaluate management strategies to improve the availability of prey/food resources for SGCN whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources. Monitor and investigate the management strategies over time to determine success and/or the need to revise methods.

3.5.4.2 Develop, implement, monitor and evaluate management strategies to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

3.5.4.3 Investigate alternative saltmarsh mosquito control methods that may produce benefits for coastal marsh dependent SGCN wildlife, including but not limited to high-marsh nesting birds and migrating shorebirds and landbirds.

3.5.4.4 Investigate the effects of mosquito control methods on freshwater aquatic and semi-aquatic SGCN including but not limited to, amphibian, fish, dragonfly, and damselfly populations.

3.5.4.5 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

3.5.4.6 Investigate the feasibility of mitigating for the impacts of contaminants to vulnerable wildlife, particularly SGCN. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.5.4.7 Investigate the feasibility and potential for success of conducting genetic rescue through translocation and/or reintroduction of animals into suitable habitat that was historically occupied to increase genetic diversity and reconnect isolated populations. Methods of investigation should include, but are not limited to, thorough literature reviews, expert opinions, identifying potential pitfalls (e.g., species' fidelity to their range or critical areas), and an examination of historic and current SGCN population distribution and suitable habitat availability.

3.5.4.8 Develop a habitat improvement and restoration program to restore cold-water fish ecosystems and populations.

3.5.4.9 Conduct studies to evaluate the impacts of roads on SGCN and develop, implement and conduct studies to evaluate the effectiveness of methods to reduce road mortality of wildlife (e.g. wildlife underpasses, road closures).

3.5.4.10 Develop BMPs for lighting of/on tall structures that minimize harm to and/or disorientation of wildlife, in particular but not limited to migratory birds, bats and invertebrates.

Level 1	Level 2	Level 3	Level 4: NJ-specific Conservation Action Statements

3.5.4.11 Develop aquaculture practices in the Delaware Bay that are compatible with the recovery of SGCN.

3.5.4.12 Investigate and develop strategies to reduce "by-catch" of SGCN and other non-target species. Present findings and strategies to NJ DEP and conservation organizations for review and possible implementation. Develop a database documenting by-catch for use in management planning decisions.

3.5.4.13 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.4.14 Develop and implement agreements, and update existing agreements, with government agencies regarding the protection of critical SGCN habitats (e.g., significant breeding populations of beach nesting birds, colonial waterbird nesting areas, bat colonies, etc.).

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.17 Investigate new, non-invasive techniques for SGCN population evaluation through literature review, expert opinion, trial studies (if low risk), etc.

3.5.4.18 Investigate the effectiveness of survey techniques through selected “ground truthing” and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

3.5.4.20 Evaluate the effectiveness and potential impacts on bat hibernacula (bats and internal conditions) of gating bat hibernacula and/or installing additional supports for structural soundness. Amend management strategies as needed.

3.5.4.21 Develop BMPs to address problematic species and diseases of unknown origin.

3.5.4.22 Investigate the efficacy of implementing strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities.

3.5.4.23 Reduce the impacts of entrainment, impingement and thermal discharge at power plants by working with conservation partners, academia, etc. to ensure that best available technologies are utilized wherever possible.

4 Education

4.1 Educator/Instructor training: *Training of educators/instructors on aquatic resources.*

4.1.0 Public education

4.1.0.1 Provide educational resources and training programs to private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

Level 1	Level 2	Level 3	Level 4: NJ-specific Conservation Action Statements

4.1.1 Aquatic resource education: *Training of new instructors and teachers in aquatic resource education who will teach others Note: This includes teachers, nature center staff and camp counselors who attend ARE workshops, teachers who help the agency write curriculum, etc.*

4.1.1.1 Provide educational resources and training programs to teachers in aquatic resource education that includes information regarding climate change and sea-level rise for incorporation into the class curriculum and/or as the focus of school field trips.

4.1.1.2 Provide educational resources and training programs to teachers in aquatic resource education that includes information regarding how coastal stabilization negatively impacts wildlife by preventing natural processes for incorporation into the class curriculum and/or as the focus of school field trips.

5 Facilities and Areas

5.15 Wildlife Management Areas: *Facilities at Wildlife Management Areas.*

5.15.6 Roads

5.15.6.1 Clearly post areas/roads where vehicle access is permitted.

5.15.6.2 Clearly post areas/trails where vehicle access is not permitted.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.1 Enhance and increase the effective size of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates by securing adjacent habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.3 Secure and protect riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.4 Secure and protect fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.5 Secure and protect critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.6 Secure and protect old-growth forest stands with large trees and/or stands that are approaching or being actively managed for old growth forests, in particular those within large, contiguous forest tracts, through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.7 Secure and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.8 Secure and protect scrub-shrub habitats for SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

Level 1	Level 2	Level 3	Level 4: NJ-specific Conservation Action Statements

6.1 Land acquisition

6.1.1 Fee title: *Acquisition of lands through fee title acquisition.*

6.1.1.1 Use state, federal, and local land acquisition programs (e.g., Green Acres, Blue Acres, etc.) to acquire abandoned or failing bay shore communities and to relocate displaced people and infrastructure.

6.3 Conservation area designation: *Designation of a site or landscape as having unique and important value to fish and wildlife with or without legal protections (e.g., waterfowl breeding area, Marine Protected Area).*

6.3.0 Conservation area designation strategies

6.3.0.1 Promote the protection of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates and enhance these lands by increasing the effective size through conservation area designations of stopover habitats and adjacent private lands.

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.3 Increase the protection of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through conservation area designations.

6.3.0.4 Promote the protection of fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through conservation area designations.

6.3.0.5 Promote the protection of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through conservation area designations.

6.3.0.6 Promote the protection of old-growth forest stands with large trees and/or stands that are approaching or being actively managed for old growth forests, in particular those within large, contiguous forest tracts, through conservation area designations.

6.3.0.7 Promote the protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through conservation area designations.

6.3.0.8 Promote the protection of scrub-shrub habitats for SGCN through conservation area designations.

6.3.0.9 Promote the protection of critical marine habitats for SGCN through conservation area designations.

6.4 Private lands agreements: *Number of acres that are protected by agreement with private landowners, but which do not involve active habitat improvement Note: Used extensively within the Landowner Incentive Program.*

6.4.0 Private land agreement strategies

6.4.0.1 Enter into private lands agreements to expand control burns on private lands, in particular those adjacent to conserved lands to improve SGCN habitats.

Level 1	Level 2	Level 3	Level 4: NJ-specific Conservation Action Statements

7 Law Enforcement

7.1 Law enforcement: *Enforcement of laws and regulations related to the protection of fish and wildlife.*

7.1.2 National Level

7.1.2.1 Enforce regulations to protect nesting bird colonies from human disturbance.

7.1.3 Sub-national Level

7.1.3.1 Enforce slow wake zones and marine conservation area regulations to protect aquatic vegetation.

7.1.3.2 Increase the number of law enforcement officers tending to wildlife issues to a reasonable number to sufficiently cover the State and marine waters.

7.1.4 Scale Unspecified

7.1.4.1 Improve enforcement of policies and/or regulations that promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

7.1.4.2 Restrict human activity from staging areas for red knots and other migratory shorebirds through increasing law enforcement presence.

7.1.4.3 Increase law enforcement presence proximate to sensitive areas [e.g., avian nesting sites, in particular rookeries, and reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively)] to deter human activity and subsequent disturbance to SGCN.

7.1.4.4 Improve enforcement of policies/regulations aimed at protecting and preserving critical coastal and marsh habitats, and secure mitigation for losses that create an environmental benefit.

7.1.4.5 Enforce current policies and/or regulations to increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal SGCN, and implement and enforce amended policies/regulations.

7.1.4.6 Recruit law enforcement to assist in the protection and enhancement of SGCN populations, in particular endangered species, through improved awareness of species through trainings, partnerships, and other methods. Information should include but is not limited to: 1) Issues concerning illegal collection of reptiles, 2) Persecution of rare snakes, 3) Illegal recreational activities on public lands (e.g., off-road vehicles) and their impact on wildlife, 4) Identification of sensitive areas, critical sites and/or "hot-spots" for collection.

7.1.4.7 Increase law enforcement presence to enforce regulations governing recreational activities (e.g., the use of personal watercraft and off road vehicles, caving, rock climbing, etc.) on conserved lands and within other sensitive habitats, and discourage activities that cause harm or disturbance to vegetation, wetlands, fish and wildlife.

7.1.4.8 Implement policies that protect critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates.

7.1.4.9 Implement policies that improve and secure habitat connections between conserved SGCN habitats.

7.1.4.10 Implement policies that promotes expanding acreages and enhances the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

7.1.4.11 Implement and enforce policies/regulations that will increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

Level 1	Level 2	Level 3	Level 4: NJ-specific Conservation Action Statements

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.13 Implement policies that protect vernal pool habitats to benefit SGCN that rely upon them and promotes connectivity of SGCN populations.

7.1.4.14 Implement policies that protect existing and developing old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

7.1.4.15 Implement policies that preserve and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

7.1.4.16 Implement policies that protect and restore riparian areas.

7.1.4.17 Improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

7.1.4.18 Increase law enforcement presence at important nesting areas on marsh islands to increase the likelihood of boat users acting in a manner that reduces disturbance to birds.

7.1.4.19 Implement policies that protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

7.1.4.20 Implement policies and/or regulations with the objective of reducing "by-catch" of SGCN and other non-target species.

7.1.4.21 Implement regulations for lighting of/on tall structures that will minimize harm to and/or disorientation of wildlife, and enforce within state, county and local permitting processes.

7.1.4.22 Implement policies and/or regulations that prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

7.1.4.23 Implement policies that minimize wildlife road mortality.

7.1.4.24 Implement protective measures to benefit urban-associated SGCN such as restricting human access, buffering sensitive areas with postings, noise and/or light restrictions in sensitive areas and/or during sensitive periods such as breeding, etc.

7.1.4.25 Encourage the enforcement of municipal laws regulating domestic pets that may predate on wildlife.

7.1.4.26 Educate law enforcement personnel that there may be unauthorized research projects taking place and to encourage them to investigate any activities that appear to be harmful to wildlife.

8 Outreach

8.1 Partner/stakeholder engagement: *Engagement of partners to achieve shared objectives and broader coordination across overlapping areas.*

8.1.0 Partner/stakeholder engagement strategies

8.1.0.1 Coordinate research efforts among government agencies, non-government conservation partners and other stakeholders to investigate the impacts of aquaculture on migratory shorebirds, waterfowl, finfish, shellfish and other SGCN and their habitats, to determine relative effects of farming locations and aquaculture techniques, and to evaluate management actions to minimize such impacts.

8.1.0.2 Develop a team of personnel from government entities, conservation organizations and other stakeholders engaged in oil/gas spill response for marine and freshwater habitats to develop a feasible plan for oil spill response and/or to amend NJ's current oil spill response plan that clearly outlines each organizations responsibilities and an assessment and location list of available equipment for boom deployment during oil spills.

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

Level 1	Level 2	Level 3	Level 4: NJ-specific Conservation Action Statements

8.1.0.4 Engage government agencies, conservation partners and other stakeholders in constructive dialogues encouraging them to influence policy change and the creation of incentives through a habitat bill and/or municipal ordinances for backyard habitat.

8.1.0.5 Engage government agencies, conservation partners and other stakeholders in discussions focused on establishing a long-term monitoring program for submerged aquatic vegetation distribution throughout Barnegat, Little Egg Harbor and Great Bay.

8.1.0.6 Engage government agencies, conservation partners and other stakeholders in discussions focused on sharing information regarding coastal and marine critical wildlife habitats, developing comprehensive mapping to assist in reducing impacts of energy production activities, and establishing a long-term monitoring program to update the data. Ensure this information is available to appropriate personnel for planning or response measures.

8.1.0.7 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting coastal boating and recreation communities about eelgrass/widgeongrass, their impacts on marine environments, and the value, fragility and location of submerged aquatic vegetation beds and habitats.

8.1.0.8 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting sportsmen's organizations and fisheries addressing the potential effects of over-harvesting wildlife and promote "catch and release".

8.1.0.9 Review the marine fish code enforcement policies relative to SGCN or sensitive game species' populations and fecundity, and amend the harvest quota or "bag limits" as needed, and address enforcement of such quotas.

8.1.0.10 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting sportsmen's organizations and fisheries, as well as public constituents, addressing the potential impacts of over-harvesting wildlife can have on the ecological system and to promote "sustainable harvest".

8.1.0.11 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting sportsmen's organizations and fisheries, as well as public constituents, addressing the unintended effects abandoned fishing gear, tackle and crab pots can have on wildlife, and promote the collection and/or reporting of abandoned items and their locations.

8.1.0.12 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting sportsmen's organizations and fisheries, as well as public constituents, addressing the unintended effects fishing gear and tackle can have on wildlife.

8.1.0.13 Engage DOD in a constructive dialogue regarding strategies to minimize disturbances to all SGCN (i.e., beyond their federal requirements) from forest management and other practices on their lands.

8.1.0.14 Engage DOD in a constructive dialogue regarding strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities.

8.1.0.15 Engage government agencies, conservation partners and other stakeholders in discussions encouraging and supporting the creation of laws and policies requiring vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

8.1.0.16 Engage local governments in discussions regarding the importance of them adopting/passing ordinances which require assessing and addressing secondary impacts (i.e., ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

8.1.0.17 Engage municipalities in constructive dialogue to identify and minimize destruction of areas prioritized for early succession forest management.

Level 1	Level 2	Level 3	Level 4: NJ-specific Conservation Action Statements

8.1.0.18 Engage NJDOT, NJ Transit Authority and other road management entities, wildlife conservation organizations/agencies (e.g., Division of Fish and Wildlife, New Jersey Conservation Foundation, Conserve Wildlife Foundation of NJ), and communities and citizens in discussions regarding the importance of and methods to enhance habitat connectivity, and work together to develop feasible strategies for ensuring that wildlife can disperse naturally and safely across roads and similar barriers to terrestrial and/or aquatic habitats.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.20 Organize a small focal group of government and non-government agencies/organizations responsible for decisions regarding beach/dune management to share and coordinate their goals so that comprehensive planning can attempt to meet all needs.

8.1.0.21 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation human-subsidized and/or overabundant, native species cause to local nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.22 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation invasive species cause to native nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.23 Work with the NJ Division of Fish and Wildlife's Bureau of Marine Fisheries, local recreational and commercial fisheries associations, and fishers to develop a process that encourages fishermen to report the number and location of lost pots to the appropriate state agency/agencies at the end of the harvest season.

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.26 Coordinate across federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to woodland landowners to adopt or endorse consistent best management practices concerning controlled burns to maintain and/or improve forested habitat for wildlife.

8.1.0.27 NJ Division of Fish and Wildlife and their Game Council, and appropriate conservation partners and other stakeholders to review the freshwater fish code relative to SGCN or sensitive game species' populations and fecundity, and support amendments to the harvest quota or "bag limits" as needed.

8.1.0.28 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting sportsmen's organizations, as well as public constituents, addressing the unintended hazard of lead-shot on wildlife, in particular scavengers.

8.1.0.29 Government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding the interactions between migratory shore birds, horseshoe crabs, and oyster-growers, and the potential impacts on shore birds and horseshoe crabs.

8.1.0.30 Government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.31 Government agencies, conservation partners and other stakeholders to work together to create GIS mapping for marine wildlife and habitat to assist in reducing impacts of energy production activities. Ensure this information is available to appropriate personnel for planning or response measures.

Level 1	Level 2	Level 3	**Level 4: NJ-specific Conservation Action Statements**

8.1.0.32 Work with NJ DEP's Water Management, other state agencies and watershed organizations to determine if mitigation is warranted at applicable power plants.

8.1.0.33 Engage government agencies, conservation partners and other land managers, communities, landowners, and commercial and industrial stakeholders in discussions regarding the importance of protecting and methods to protect priority wetlands beyond the levels afforded through regulation by maintaining and/or restoring optimal biological buffers around wetlands.

8.1.0.34 Work with the NJ Education Association and Department of Education to design curriculum and outdoor experimental learning opportunities, and provide training to teachers on implementation of these activities.

8.1.0.35 Promote backyard habitat management to create and/or enhance food availability for migratory species (birds, bats, invertebrates) on private lands.

8.1.0.36 Reduce "by-catch" of SGCN and other non-target species by enlisting voluntary cooperation to use exclusion devises, appropriate trap sizes, etc. through education and outreach.

8.1.0.37 Enlist landowners and NJ citizens in the protection of and survey efforts for SGCN, in particular rare species, by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management and wildlife-related volunteer programs.

8.1.0.38 Engage partners, stakeholders and land managers in constructive dialogue promoting forest stewardship for SGCN that use core forests and forested corridors.

8.1.0.39 Deploy stewards at active nesting areas to work with and educate the public on how to reduce disturbance to birds.

8.1.0.40 Encourage researchers, land managers, naturalists and enthusiasts to follow proper procedures for the coordination and/or permitting of research/management activities involving wildlife and sensitive habitats, and discourage activities that alter vegetation or wetlands, or cause harm or disturbance to wildlife.

8.1.0.41 Engage beach-owning entities (e.g., government, non-government and non-profit organizations, and landowners) in a constructive dialogue to develop guidelines for management of beach/dune communities and to ensure that each group is educated and aware of the needs of the other groups.

8.1.0.42 Engage citizens, wildlife observers and photographers through discussions and distributable information regarding the importance of and encouraging implementing responsible and ethical behavior when observing wildlife by developing an alliance of wildlife photographers and widely circulating recommendations on how to reduce impact.

8.1.0.43 Engage Nuisance Wildlife Control Operators (NWCOs), conservation partners, and the public in conserving bat populations by advising proper exclusion methods from buildings, offering bat houses where roosting habitat is needed, and improving the public's understanding and acceptance of bats.

8.1.0.44 Engage conservation partners, stakeholders, government agencies and other land stewards in constructive dialogues encouraging their inclusion of controlled burns in forest and other stewardship plans.

8.1.0.45 Form cooperative partnerships with airports and airline companies to facilitate habitat creation away from airports and outside of flight patterns, and to identify seasonal wildlife strike risks to determine if seasonal shifts in flight patterns will minimize this risk.

8.1.0.46 Form cooperative partnerships with dredging companies to facilitate habitat creation and enhancement within project areas, and to identify seasonal timing of activities that would minimize impacts to wildlife and their habitats.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.1.0.48 Form cooperative partnerships with transportation and shipment agencies and companies to facilitate habitat creation and enhancement away from and outside of project areas and to identify seasonal timing of activities that would minimize impacts to wildlife.

Level 1	Level 2	Level 3	Level 4: NJ-specific Conservation Action Statements

8.1.0.49 Reduce the impacts of entrainment, impingement and thermal discharge at power plants by working with conservation partners, academia, etc. to ensure that best available technologies are utilized wherever possible.

8.1.0.50 Engage Nuisance Wildlife Control Operators (NWCOs), conservation partners, and the public in conserving snake populations by advising proper removal from buildings, exclusion methods from buildings, and improving the public's understanding and acceptance of snakes.

8.2 Recruitment and retention activities: *Participation in programs intended to recruit and retain anglers, boater, hunters or wildlife watchers.*

8.2.3 For wildlife watching: *Participation in programs intended to recruit and retain wildlife watchers Note: this activity has limited eligibility for funding through WSFR grant programs.*

8.2.3.1 Develop and implement nature-focused tourism opportunities including wildlife viewing sites, interpretive signage highlighting unique ecosystems/habitats, and wildlife-related recreational opportunities that do not negatively impact SGCN or their habitats.

8.3 WSFR program/subprogram outreach: *Provision of educational information on WSFR grants and grant programs to a variety of audiences through a variety of means (e.g., participating in trade shows to share information WSFR funded work; building kiosks to display WSFR program information at supported areas and facilities).*

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.1 Utilize WSFR grant funds, in combination with alternate funding sources as needed, to implement a scientific data-driven, extensive educational/outreach program targeting sportsmen's organizations and fisheries, as well as public constituents, addressing the potential impacts of over-harvesting wildlife can have on the ecological system and to promote "sustainable harvest".

8.3.0.2 Utilize WSFR grant funds, in combination with alternate funding sources as needed, to implement an extensive educational/outreach program consisting of displays, fliers, list-serve mailings, Facebook posts and speaking engagements with sportsmen's organizations and fisheries, as well as public constituents, addressing the unintended effects fishing gear and tackle can have on non-target species.

8.3.0.3 Utilize WSFR grant funds, in combination with alternate funding sources as needed, to implement catch and release outreach program(s).

8.3.0.4 Utilize WSFR grant funds, in combination with alternate funding sources as needed, to implement an extensive educational/outreach program consisting of displays, fliers, list-serve mailings, Facebook posts and speaking engagements with sportsmen's organizations and fisheries addressing the unintended effects abandoned fishing gear, tackle and crab pots can have on wildlife.

8.3.0.5 Develop and provide (or otherwise make publicly available) educational programs and/or materials that provide homeowners information on how to design dwellings and other structures in a manner that is wildlife friendly (e.g., using bird-safe glass on windows).

8.3.0.6 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners, land managers and local communities to discourage the presence of managed cat colonies and trap, neuter and release programs in wildlife habitats.

8.3.0.7 Develop and provide (or otherwise make publicly available) educational programs and/or materials that describe the negative impacts of off-road vehicles and watercraft use in and adjacent to critical SGCN habitats, and the importance of confining such activities to more appropriate locations and/or seasons.

8.3.0.8 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate recreationists and encourage landowners to eliminate garbage in the vicinity of suitable wildlife habitat, in particular SGCN habitat. Information should include the detrimental impacts garbage may have on various wildlife species.

Level 1	Level 2	Level 3	**Level 4: NJ-specific Conservation Action Statements**

8.3.0.9 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners and land managers to include only native plants in landscaping and restoration projects. Provide information to assist them in detecting problematic establishment of invasive, non-indigenous plants.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.11 Develop and provide (or otherwise make publicly available) educational programs and/or materials to the public, wildlife-related professionals, foresters, etc., that describe the value of species that are often feared (e.g., snakes, bats, spiders, Allegheny woodrat) and/or deemed a "nuisance" (e.g., squirrel, deer, snapping turtle), and therefore, persecuted by people. Include information on tolerance, proper identification, eviction from human dwellings, how to minimize the animal's presence on the property, and/or how to live in harmony with the animal.

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.14 Develop an educational outreach program using a variety of media to ensure maximizing the distribution of information, in particular targeting sportsmen's organizations and fisheries, regarding the unintended effects abandoned fishing gear, tackle and crab pots can have on wildlife, including non-target species.

8.3.0.15 Develop an educational outreach program for citizens regarding: 1) The impacts to wildlife as a result of plastic bags entering aquatic and marine systems, 2) The importance of decreasing the amount of plastic shopping bags in circulation, 3) The need for businesses to voluntarily charge for bags or reimburse people for using their own non-plastic bags, and 4) The need for their assistance through public pressure on legislators and government to pass legislation that that limits the amount of plastic shopping bags in circulation.

8.3.0.16 Develop an educational outreach program using a variety of media to ensure maximizing the distribution of information, in particular targeting sportsmen's organizations and fisheries, promoting "catch and release" and the impacts excessive harvests can have on wildlife populations.

8.3.0.17 Develop an educational outreach program using a variety of media to ensure maximizing the distribution of information, in particular targeting sportsmen's organizations and fisheries, promoting "sustainable harvest" using scientific data, and garner support from constituents through this outreach.

8.3.0.18 Develop an Eelgrass/Widgeon Grass education and mapping program to educate coastal boating and recreation communities about the value, fragility and location of submerged aquatic vegetation beds and habitats.

8.3.0.19 Develop an educational outreach program for the public on the devastating effects predators can have on native nesting wildlife.

8.3.0.20 Develop an educational outreach program for landowners, particularly those in the coastal and bay areas, boaters, and the general public with information about the negative impacts on marine wildlife and habitats, and steps they can implement to reduce these impacts.

8.3.0.21 Develop an educational outreach program for the general public, in particular those within and adjacent to coastal and riparian areas on the realities of sea-level rise to help citizens living in these areas understand how this will affect them, how coastal stabilization negatively impacts wildlife by preventing natural processes, and how their decisions impact species.

8.3.0.22 Post signage in sensitive coastal habitats (e.g., bird and Diamondback Terrapin nesting areas) to educate the boating community on responsible use of these areas.

Level 1	Level 2	Level 3	Level 4: NJ-specific Conservation Action Statements

8.3.0.23 Develop an educational outreach program for coastal municipalities and residents to promote an understanding of the benefits of soft structures over hard structures for shoreline stabilization.

8.3.0.24 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

8.3.0.25 Develop educational outreach programs for landowners, nurseries and the general public regarding the negative impacts of invasive and non-native plants on our natural communities.

8.3.0.26 Develop educational outreach programs for private and public landowners and land managers regarding the importance of and how to manage core forests and forested corridors in a way that will be beneficial for SGCN, particularly endangered, threatened and special concern species.

8.3.0.27 Develop educational outreach programs for public and private landowners and land managers regarding the importance of structural habitat diversity, methods to increase diversity, and/or incentive programs available to increase habitat diversity.

8.3.0.28 Develop educational outreach programs for public and private landowners and land managers regarding the importance of managing grasslands for grassland-dependent species, methods of management, and/or incentive programs available.

8.3.0.29 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about the importance of maintaining a vegetative buffer along riparian and aquatic habitats to intercept storm water runoff and minimize soil erosion.

8.3.0.30 Develop educational outreach programs for private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

8.3.0.31 Develop an educational outreach program for landowners and citizens on the secondary impacts of rodenticides on predators and scavengers.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning: *Leading or participating in land use planning for rural, urban or agricultural lands (e.g., assist in developing county-wide zoning plans, participate in workgroup regarding low impact development siting).*

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.4 Develop a plan that directs the creation of new impoundments and/or the expansion of bogs for cranberry farming within or immediately adjacent to critical forested habitats in a manner that minimizes impacts on the natural hydrology of the watershed and subsequently, the natural wetlands in the area.

9.1.0.5 Develop a plan that directs the creation or expansion of energy or utility rights-of-way in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

Level 1	Level 2	Level 3	Level 4: NJ-specific Conservation Action Statements
			9.1.0.6 Develop a plan that directs the creation or expansion of roads and railroads or the re-establishment of abandoned railroads within and adjacent to critical forested habitats in a manner that minimizes the impacts on critical forested habitats and the wildlife community.
			9.1.0.7 Develop a plan that directs the maintenance of or new channelization of forested streams and rivers in a manner that minimizes impacts of the aquatic ecological system and adjacent forest.
			9.1.0.8 Develop a plan that focuses on strategies for oil pipelines to avoid sensitive habitats that would be highly impacted by oil spills.
			9.1.0.9 Develop a plan that focuses on strategies to minimize the creation of renewable energy farms (e.g., solar, wind) and related infrastructures within and their impacts on forested habitats and the wildlife community.
			9.1.0.10 Develop a plan that focuses on strategies to minimize the impacts of mining on critical forested habitats.
			9.1.0.11 Develop a plan that focuses on strategies to minimize the impacts of power plants on critical forested habitats and the wildlife community.
			9.1.0.12 Develop a plan to avoid freshwater tidal management.
			9.1.0.13 Develop a plan to minimize agriculture that would result in groundwater withdrawal in critical forested areas.
			9.1.0.14 Develop a plan to minimize development that would result in groundwater withdrawal in critical forested areas.
			9.1.0.15 Develop a plan to minimize fragmentation of terrestrial and aquatic habitats by roads.
			9.1.0.16 Develop a plan to minimize new lawnscapes and preserve natural vegetation within and adjacent to critical forest areas.
			9.1.0.17 Develop a plan to minimize nutrient and effluent loads from aquaculture practices.
			9.1.0.18 Develop a plan to minimize the effects of road widening and traffic volume increases within critical wildlife habitat areas using CHANJ products.
			9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.
			9.1.0.20 Develop a plan to minimize the impacts of existing agricultural properties adjacent to and the conversion of forest habitats (terrestrial and aquatic, within or adjacent to critical forests) to agriculture, grazing areas/livestock farms, and plantations.
			9.1.0.21 Develop a plan to minimize the use of any-sized dam in critical forested areas.
			9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.
			9.1.0.23 Develop a plan to mitigate the effects of transportation barriers by using CHANJ products.
			9.1.0.24 Develop a plan to prevent livestock from entering water bodies in critical forested habitats.
			9.1.0.25 Develop a plan to prevent the conversion of forested stream buffers to pastures in critical forested habitats.
			9.1.0.26 Develop a plan to minimize any adverse impacts of aquaculture farming techniques and structures on freshwater and intertidal habitats.
			9.1.0.27 Develop a plan to use wildlife-appropriate culverts in critical forested areas.

Level 1	Level 2	Level 3	Level 4: NJ-specific Conservation Action Statements

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.31 Develop wetland restoration plans that consider the life history and needs of wildlife occupying targeted habitats.

9.1.0.32 Incorporate aquatic habitat connectivity and water quality/effluent standards into local and state aquaculture plans and BMPs.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.2 Organizational strategic and CMS planning: *Development of agency strategic and operational plans and fish and wildlife comprehensive management systems Note: Does not include actions to implement plans.*

9.2.1 Organizational strategic and operational planning: *Development of agency strategic and operational plans Note: Does not include actions to implement plans.*

9.2.1.1 Identify and codify legal ORV access areas on state lands.

9.3 Species and habitat management planning: *Development of management plans for fish and wildlife species and habitats.*

9.3.1 Species management planning: *Development of management plans for fish and wildlife species (e.g., interjurisdictional fisheries management planning).*

9.3.1.1 Develop a management plan specific to River Herring/Alewife to ensure a sustainable population in perpetuity.

9.3.1.2 Develop a management plan to improve the availability of prey/food resources for SGCN whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources.

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.5 Develop response plans to address disease outbreaks within wildlife populations, in particular SGCN.

9.3.1.6 Amend NJ's current oil spill response plan to 1) expand the geographic area addressed, 2) expand the targeted species impacted and in need of recovery, and 3) revise current and integrate new actions into the plan as needed.

9.3.1.7 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.1.8 [*Reserved**]

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

* "Reserved" indicates placeholders for future edits or additions.

Level 1	Level 2	Level 3	Level 4: NJ-specific Conservation Action Statements

9.3.1.10 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.1.11 Develop a management plan using predator-control techniques aimed at improving SGCN populations and methods to minimize the impact of those species carrying parasites or diseases that may impact SGCN (e.g., raccoon roundworm kills Allegheny woodrat).

9.3.1.12 Develop a management plan to benefit urban-associated SGCN based on research.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.14 Create species management plans that will promote the protection and where appropriate, the development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

9.3.1.15 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.1.16 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.1.17 Evaluate the potential benefits to high marsh species (such as Black Rail and Northern Harrier) by restoring salt hay farms along Delaware Bay.

9.3.1.18 Using baseline and monitoring data, develop a plan and seek funding for the removal of horseshoe crab impingement hazards.

9.3.1.19 Develop management strategies for freshwater SGCN fish and incorporate them into existing Freshwater Fisheries Management Plans.

9.3.1.20 Use compiled life history information on urban-associated SGCN regarding threats, breeding, fecundity, survival, habitat needs, wintering sites/roosts, migration routes and destinations, etc. to develop wildlife management strategies to benefit such species.

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

9.3.2 Listed species recovery planning: *Development of recovery plans for federal or state listed species.*

9.3.2.1 Develop proactive species recovery plans for all endangered and threatened species including guidance and objectives pertaining to critical and supporting habitat to meet and maintain recovery goals.

9.3.3 Habitat management planning: *Development of management plans for habitats and natural processes (e.g., management planning for longleaf pine habitat; Habitat Conservation Plan development).*

9.3.3.1 Develop a management plan to improve the availability of prey/food resources for SGCN whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources.

9.3.3.2 Develop a management plan for using mined sand or dredged material to improve habitat for wildlife, particularly for spawning horseshoe crabs and migrating shorebirds.

9.3.3.3 Integrate best management practices (BMPs) regarding dune and beach management into beach nesting bird management agreements with government agencies (and private landowners where necessary).

9.3.3.4 Create habitat restoration plans to repair marshes and associated beaches damaged by salt hay farm/dike abandonment for all bay shore areas currently degraded.

9.3.3.5 Develop a management plan using forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

Level 1	Level 2	Level 3	Level 4: NJ-specific Conservation Action Statements
			9.3.3.6 Develop a management plan for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.
			9.3.3.7 Develop a management plan to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.
			9.3.3.8 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.
			9.3.3.9 Develop a response plan to outbreaks using BMPs to control infestations and limit their spread in a way that avoids excessive harm to non-target species.
			9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.
			9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.
			9.3.3.12 Develop a management plan using engineering standards that embrace both shore protection/resiliency and habitat creation for shorebirds, horseshoe crabs and other coastal species along the Atlantic and Delaware Bay coasts.
			9.3.3.13 Develop a management plan that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas and prevents or ameliorates near-term impacts of climate change throughout the State, but in particular within the coastal and Delaware Bay areas.
			9.3.3.14 Develop a management plan using aquaculture practices in the Delaware Bay that are compatible with the recovery of SGCN.
			9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.
			9.3.3.16 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.
			9.3.3.17 Develop a management plan for prescribed burning that will benefit Pinelands dependent species and increase or maintain habitat quality for these species in the Pinelands.
			9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.
			9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.
			9.3.3.20 Develop an action plan for immediate implementation should habitat levels fall below the minimum necessary size and/or structure within the Cape May Peninsula to sustain the avian migration.
			9.3.3.21 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

Level 1	Level 2	Level 3	**Level 4: NJ-specific Conservation Action Statements**

9.3.3.22 Create management plans to minimize and/or prevent wildlife road mortality that will incorporate wildlife passages in conjunction with barrier fencing and, where possible, seasonal closures. Aquatic-associated passages must avoid disturbance to the natural streambeds and riparian habitat, permit high volumes of water to flow freely, and provide adequate travel corridors for terrestrial wildlife, while maintaining stream flow for fish passage. Bridges that span rivers and streambeds and include floodplain habitat on either side of the span to provide travel corridors for terrestrial wildlife are preferred over culverts.

9.3.3.23 Create forest management plans that will promote the protection and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

9.3.3.24 Develop a plan to improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

9.3.3.25 Develop a habitat management plan focused on areas important to near-shore, coastal species (e.g., herring, sturgeon, terrapin, nesting birds) that prioritizes these areas to direct resources to minimize the impacts of sea-level rise, flooding and storms (including extreme rain events) such as increased erosion of beach, mudflat and marsh habitats, and the increased risk of saltwater intrusion into freshwater habitats. Gather "best information" for spatial modeling of anticipated habitat shifts from sea-level rise, flooding, etc.

9.3.3.26 Develop a management plan for parcels of suitable size to be managed for native herbaceous plant species that support breeding grassland dependent species.

9.3.3.27 Develop a management plan to expand breeding habitat and connectivity for tiger salamanders and other obligate vernal pool breeders.

9.3.3.28 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.3.29 Develop habitat management plans aimed at reducing or eliminating negative impacts of ORVs.

9.3.3.30 Using baseline and monitoring data, develop a plan and seek funding for the removal of horseshoe crab impingement hazards.

9.3.3.31 Using data from baseline inventory and monitoring of all current marsh islands and their vulnerability to inundation as a result of sea level rise, create a plan to delineate each island's ideal fit for habitat management (e.g., restoration, hasting, dredging). Planning will factor in criteria to designate which islands should be maintained or restored, and which will be passively allowed to submerge.

9.3.3.32 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3.33 Evaluate the potential benefits to increasing high marsh habitat by restoring salt hay farms along Delaware Bay.

9.3.3.34 Include controlled burn prescriptions in forest and stewardship plans to improve wildlife habitat.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

9.3.3.37 Develop management strategies for freshwater SGCN fish and incorporate them into existing Freshwater Fisheries Management Plans.

Level 1	Level 2	Level 3	Level 4: NJ-specific Conservation Action Statements

9.3.3.38 Use compiled life history information on urban-associated SGCN regarding threats, breeding, fecundity, survival, habitat needs, wintering sites/roosts, migration routes and destinations, etc. to develop habitat management strategies to benefit such species.

11 Technical Assistance

11.1 Environmental review: *Review of agency and private sector policies, projects and plans (primarily related to development and adverse impacts to natural resources) to help ensure potential impacts to fish and wildlife are avoided, minimized and/or compensated/mitigated (e.g., review of municipal pier development, review of transmission corridor siting).*

11.1.1 Review of proposed projects: *Review of proposed development projects to help ensure that impacts to fish and wildlife are minimized and resource benefits are maximized.*

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.3 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.6 Review all projects to be conducted in or adjacent to coastal wetlands and marshes, and provide recommendations on how to best avoid or reduce human disturbance at nesting areas (for example, timing restrictions) and actions not permitted.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.9 Review strategies for creating or enhancing connectivity (e.g., installing appropriately-sized wildlife passages) between wetlands to allow wildlife to disperse naturally and safely.

11.1.1.10 Use CHANJ mapping in reviews of proposed energy, mining, transportation and utility service companies/agencies' projects to attempt to maintain habitat connectivity and reduce fragmentation, and identify potential impacts of the projects.

11.1.1.11 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed offshore energy projects relating to drilling, extraction and distribution of petroleum and gas products to reduce habitat destruction and minimize impacts on wildlife.

11.1.1.12 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed solar farm projects to reduce habitat fragmentation and minimize impacts on wildlife.

11.1.1.13 Use the best available science (species data, habitat present, wind farm layout options, wind blade impacts on migratory species, location of migration routes, etc.) when conducting regulatory reviews of proposed wind farm projects to minimize impacts on migratory and resident wildlife and reduce habitat fragmentation.

Level 1	Level 2	Level 3	Level 4: NJ-specific Conservation Action Statements

11.1.2 Review of proposed policies and plans: *Review of non-conservation oriented policies and plans to help ensure that impacts to fish and wildlife are minimized and resource benefits are maximized (e.g., review of harbor dredging plan, review of state highway plans).*

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.2.2 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.2.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into the environmental review process to help establish policies and plans that minimize the impact of aquaculture on fish and wildlife.

11.1.2.4 Review strategies for creating or enhancing connectivity (e.g., installing appropriately-sized wildlife passages) between wetlands to allow wildlife to disperse naturally and safely.

11.2 Technical assistance: *Provision of professional training and technical assistance to others on fish and wildlife assessment and management.*

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.2 Provide technical support to public and private landowners and land managers for controlling invasive, native and non-native plant species in order to increase structural habitat diversity.

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.4 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the secondary impacts of rodenticides on predators and scavengers.

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.7 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on the importance of maintaining habitat connectivity, minimizing fragmentation, and the use of CHANJ products to help them target areas for such planning.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

Level 1	Level 2	Level 3	Level 4: NJ-specific Conservation Action Statements
			11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.
			11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.
			11.2.0.11 Provide educational resources, training programs, and on-the-ground guidance to private and public landowners and land managers on the benefits of and for creating young forest and early succession habitat for SGCN.
			11.2.0.12 Provide educational resources and technical support to public landowners and land managers for managing grasslands for grassland-dependent species.
			11.2.0.13 Provide educational resources and technical support to public landowners, private landowners with sufficient acreage, and land managers to promote the protection and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.
			11.2.0.14 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters), and to enhance or restore biologically appropriate buffers.
			11.2.0.15 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and landowners about the importance of retaining and in an effort to protect, create, enhance and/or restore vegetation along aquatic habitats.
			11.2.0.16 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.
			11.2.0.17 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of vernal pools and the protection, enhancement and/or restoration of biologically appropriate buffers.
			11.2.0.18 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats.
			11.2.0.19 Provide educational resources and technical support to public and private landowners and land managers to promote the protection and/or enhancement of scrub-shrub habitats for SGCN.
			11.2.0.20 Provide educational resources and technical support to public and private landowners and land managers to promote the protection and/or enhancement of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN.
			11.2.0.21 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates to promote the protection and/or enhancement of those adjacent habitats to increase the effective size of the migratory habitat.
			11.2.0.22 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.
			11.2.0.23 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to SGCN habitats to promote the protection and/or enhancement of those adjacent habitats to increase the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and that connect conserved SGCN habitats.

Level 1	Level 2	Level 3	Level 4: NJ-specific Conservation Action Statements

11.2.0.24 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers on how to manage vegetated roadside areas (e.g., mowing, brush-hogging, etc.) on a schedule that avoids peak activity periods for wildlife and therefore, minimizes harm.

11.2.0.25 Provide educational resources, training programs, and on-the-ground guidance to resource managers regarding the assessment of and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) related to residential and commercial development.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.0.27 Provide educational resources and presentations to coastal municipalities and residents to promote the understanding of the benefits of soft structures over hard structures for shoreline stabilization.

11.2.0.28 Provide educational resources, training programs, and on-the-ground guidance to Nuisance Wildlife Control Operators (NWCOs) and the public to ensure that proper bat exclusion methods are followed when addressing issues of bats in buildings.

11.2.0.29 Provide educational resources, training programs, and on-the-ground guidance to Nuisance Wildlife Control Operators (NWCOs), conservation partners, and the public in conserving snake populations by advising proper removal from buildings, exclusion methods from buildings, and improving the public's understanding and acceptance of snakes.

11.2.1 With individuals and groups involved in resource management decision making: *Provision of professional training and technical assistance on fish and wildlife assessment and management to individuals and groups involved in resource management decision-making (e.g., provide agency-collected data to other governmental officials, train non-governmental organizations on new trapping methods, review of conservation-oriented policies and plans).*

11.2.1.1 Engage partners and stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.3 Provide educational resources, training programs, and on-the-ground guidance to DOD to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop and implement forest management and other practices that minimize disturbances to SGCN (i.e., beyond their federal requirements).

11.2.1.4 Provide educational resources, training programs, and on-the-ground guidance to dredging companies and resource managers on habitat creation and enhancement away from and outside of shipping lanes, and to identify seasonal timing of activities that would minimize impacts to wildlife and their habitats.

11.2.1.5 Provide educational resources, training programs, and on-the-ground guidance to municipalities, state and federal agency resource managers on tasks such as writing and integrating Beach Management Plans into other management documents.

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

Level 1	Level 2	Level 3	Level 4: NJ-specific Conservation Action Statements

11.2.2 With private landowners: *Provision of technical assistance on fish and wildlife management practices to private landowners Note: Could Include development and delivery of economic incentives to private landowners to influence responsible stewardship of land/water and specific species.*

11.2.2.1 Provide technical support to farming operations and woodland landowners on ways to decrease clean farming (edge-to-edge) practices and create ecotones to benefit bobwhite and other species dependent on early successional habitat.

100 Law and Policy

100.1 Legislation: *A directive proposed by a legislative body (bills, laws, acts, statutes) within government.*

100.1.2 National Level

100.1.2.1 Create legislation to establish markets for warm-season grasses to increase the permanency of this crop on the landscape.

100.1.3 Sub-national Level

100.1.3.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.3.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.3.4 Initiate legislative action to establish an annual budgetary line item designating funds to support programs and monitoring stations throughout Barnegat, Little Egg Harbor and Great Bay focused on long-term monitoring of submerged aquatic vegetation, both native and exotic species.

100.1.4 County and Local

100.1.4.1 Enhance critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates through the local ordinances of adjacent private lands to increase the effective size of the habitat.

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.3 Expand the acreages and enhance the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN through local ordinances.

100.1.4.4 Secure wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and biologically appropriate buffers through local ordinances.

100.1.4.5 Secure SGCN-inhabited/used freshwater wetlands and biologically appropriate buffers through local ordinances.

100.1.4.6 Secure fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through local ordinances.

100.1.4.7 Secure vernal pools and biologically appropriate buffers through local ordinances.

100.1.4.8 Secure critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through local ordinances.

100.1.4.9 Secure existing and developing old-growth forest stands with large trees, in particular those within large, contiguous forest tracts, through local ordinances.

Level 1	Level 2	Level 3	Level 4: NJ-specific Conservation Action Statements

100.1.4.10 Secure critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through local ordinances.

100.1.4.11 Secure riparian areas through local ordinances.

100.1.4.12 Secure scrub-shrub habitats for SGCN through local ordinances.

100.1.4.13 Encourage municipal laws regulating domestic pets that may predate on wildlife.

100.1.4.14 Adopt/pass local ordinances which require assessing and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.5.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.5.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into state/local policy to minimize the impact of aquaculture on fish and wildlife.

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100.1.5.5 Develop legislation to provide financial support for the New Jersey Invasive Species Strike Team.

100.3 State Regulations: *A specific requirement within legislation which details how the legislation is enforced; standards adopted as rules to implement, interpret, or make specific the law enforced or administered by legislation.*

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.1 Develop (and/or improve) policies and/or regulations that will promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

100.3.0.2 Improve policies/regulations aimed at protecting and preserving critical coastal and marsh habitats and securing mitigation for losses that create an environmental benefit.

100.3.0.3 Develop policies that will promote the long term protection of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates.

100.3.0.4 Promote policies and regulations that support marine conservation zone designations in suitable areas identified through research and literature.

100.3.0.5 Develop policies that will promote improved and secure habitat connections between conserved SGCN habitats.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.7 Amend current policies and/or regulations to increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

Level 1	Level 2	Level 3	Level 4: NJ-specific Conservation Action Statements
			100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.
			100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.
			100.3.0.10 Develop policies that promote protecting vernal pool habitats to benefit SGCN that rely upon them and promotes connectivity of SGCN populations.
			100.3.0.11 Develop policies that will ensure the protection and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.
			100.3.0.12 Develop policies that promote the preservation and protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.
			100.3.0.13 Develop policies that will promote protecting and restoring riparian areas.
			100.3.0.14 Develop policies and/or regulations that increase the protective buffers of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) to biologically appropriate distances to benefit SGCN that rely upon these habitats and improve the function of the [associated] aquatic systems.
			100.3.0.15 Develop policies that promote protecting and restoring scrub-shrub habitats to benefit shrub-dependent SGCN.
			100.3.0.16 Create regulations that restrict human activity from staging areas for red knots and other migratory shorebirds.
			100.3.0.17 Develop and implement policies and/or regulations with the objective of reducing "by-catch" of SGCN and other non-target species.
			100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.
			100.3.0.19 Develop regulations for lighting of/on tall structures that will minimize harm to and/or disorientation of wildlife, in particular but not limited to migratory birds, bats and invertebrates. Implement BMPs into state, county and local permitting processes.
			100.3.0.20 Develop policies and/or regulations that prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.
			100.3.0.21 Develop policies that minimize wildlife road mortality through: 1) Requiring the integration of wildlife passages into all new and repaired roads, in particular those areas that will connect SGCN habitats, 2) Requiring current fish/wildlife passages be improved and maintained in perpetuity, 3) Supporting seasonal road closures, in particular for unimproved roads, 4) Supporting projects that work to improve connectivity of SGCN habitats such as land conservation through acquisition or other means.
			100.3.0.22 Develop regulations that will protect urban-associated SGCN (restricting human access, buffering sensitive areas with postings, noise and/or light restrictions) in sensitive areas and/or during sensitive periods such as breeding, etc.
			100.3.0.23 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address mitigation that creates an environmental benefit for losses of SGCN and their habitats.
			100.3.0.24 Create legislation to establish markets for warm-season grasses to increase the permanency of this crop on the landscape.
			100.3.0.25 Amend the harvest quota or "bag limits" within the freshwater fish code relative to SGCN or sensitive game species' as needed.
			100.3.0.26 Adopt regulations requiring the combined sewer overflow alternative analyses required by regulation address potential impacts to wildlife in watercourses or receiving water bodies.
			100.3.0.27 Amend harvest, license and/or permit requirements to incorporate guidance regarding the use of gear and/or tackle and current best practices to minimize bycatch or entanglement of non-target species.

Level 1	Level 2	Level 3	Level 4: NJ-specific Conservation Action Statements
			100.3.0.28 Amend harvest, license and/or permit requirements to require mandatory reporting by permittees/licensees of lost harvest gear, by-catch and, entanglement of non-target species.
			100.3.0.29 Amend harvest, license and/or permit requirements to incorporate the exclusion devices and/or to require trap/pot designs with a quick-corrode feature which would render the device ineffective upon short-term sustained submersion.
			100.3.0.30 Amend the NJ Bureau of Marine Fisheries commercial licensing and harvest reporting system to require fishermen to report the number and location of lost pots to the appropriate state agency/agencies at the end of the harvest season.
			100.3.0.31 Create or expand tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMPs.
			100.3.0.32 Coordinate regulations across agencies to maximize availability of and enrollment in existing Forestry Stewardship Programs (e.g., "Woodland Stewards", Farm Bill, partners, etc.) to maintain and/or improve forest habitat.
			100.3.0.33 Adopt additional timing restrictions, and any necessary permit conditions, into the Administrative Code for NJ DEP-permitted projects to minimize impacts on freshwater SGCN fish, in particular, within habitats during their vulnerable periods as identified through a thorough review of available information.
			100.3.0.34 Create legislation or policy that identifies River Herring/Alewife as a stock in the fishery thereby requiring its own Atlantic State Marine Fisheries management plan.
			100.3.0.35 Incorporate Freshwater Fish Status Assessment (Delphi Technique) results pertaining to endangered and threatened species into regulations.
			100.3.0.36 Create legislation to limit the amount of plastic from shopping bags in circulation and re-instate incentives for citizens bringing their own shopping bag to grocery store.
			100.3.0.37 Develop a law and/or policy that requires NJ DEP to continue to address and correct the allowable combined sewer overflow inputs of solid waste into the marine environment to minimize harm to wildlife and their habitats.
			100.3.0.38 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.
			100.3.0.39 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.
			100.3.0.40 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.
			100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.
			100.3.0.42 Fully adopt the former Storm water Management Rules' 300ft buffer requirements into the Flood Hazard Area Control Act Rules.
			100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.
			100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.
			100.3.0.45 Increase the controlled burn season to focus on restoring vegetative communities.
			100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

Level 1	Level 2	Level 3	Level 4: NJ-specific Conservation Action Statements
			100.3.0.47 Investigate regulatory options available to direct the location or citing of aquaculture activities in Aquaculture development zone 4 (Delaware Bay area) in a manner which minimizes the loss of wildlife habitats and adverse impacts to the environment.
			100.3.0.48 Propose new State law or regulation mandating that a State-level "development impact fee" be assessed on all new development approved by municipalities (via the Municipal Land Use Law processes), and dedicate such monies to the development and implementation of regional Habitat Conservation Plans (or existing plans/programs serving the same regional function).
			100.3.0.49 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address the issue of disturbance to habitat or species as a result of human activities (e.g., construction, bridge maintenance, road work, etc.).
			100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.
			100.3.0.51 Amend the harvest quota or "bag limits" within the marine fish code enforcement policies relative to SGCN or sensitive game species' as needed.
			100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.
			100.3.0.53 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded rights-of-way corridors associated with energy transport/transmission.
			100.3.0.54 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded surface mining areas.
			100.3.0.55 Develop regulations to address potentially adverse effects of aquaculture on SGCN species and their habitats.
			100.3.0.56 Develop regulations that when implemented will protect critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates.
			100.3.0.57 Develop regulations that when implemented will improve and secure habitat connections between conserved SGCN habitats.
			100.3.0.58 Develop regulations that when implemented will promote the expansion of acreages and enhancement of the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.
			100.3.0.59 Develop regulations that when implemented will increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.
			100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.
			100.3.0.61 Develop regulations that when implemented will protect vernal pool habitats to benefit SGCN that rely upon them and promotes connectivity of SGCN populations.
			100.3.0.62 Develop regulations that when implemented will protect existing old-growth forest stands with large trees and/or stands that are being actively managed for old growth forests, in particular those within large, contiguous forest tracts.
			100.3.0.63 Develop regulations that when implemented will preserve and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.
			100.3.0.64 Develop regulations that when implemented will protect and restore riparian areas.
			100.3.0.65 Develop regulations that when implemented will protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.
			100.3.0.66 Develop regulations with the objective of reducing "by-catch" of SGCN and other non-target species.
			100.3.0.67 Develop regulations for lighting of/on tall structures that will minimize harm to and/or disorientation of wildlife, and enforce within state, county and local permitting processes.

Level 1	Level 2	Level 3	Level 4: NJ-specific Conservation Action Statements

100.3.0.68 Develop regulations that when implemented will prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

100.3.0.69 Develop regulations that when implemented will minimize wildlife road mortality.

100.3.0.70 Develop regulations that when implemented will facilitate the restoration of dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

100.3.0.71 Develop regulations for licensing, permitting, or certification of Nuisance Wildlife Control Operators (NWCOs) that handle removal/exclusion of protected wildlife, such as bats and snakes, to ensure that proper methods are followed and that occurrences are reported.

100.3.0.72 Develop policies and/or regulations that require permit applicants and reviewers to assess the impacts of proposed projects with consideration to the cumulative and synergistic effects over time and over a larger spatial scale beyond the project site.

100.3.0.73 Develop regulations that when implemented will render the conversion of lawns to native vegetation beneficial for wildlife exempt from local lawn ordinances.

100.3.2 State Land Acquisition Programs

100.3.2.1 Increase opportunities for habitat restoration by making any necessary policy changes to state, federal and local land acquisition programs (e.g., Green Acres, Blue Acres, etc.) to allow for acquisition within abandoned or failing bay shore communities, including mechanisms to relocate displaced people and infrastructure.

100.4 State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.2 Create a policy that requires the NJ DEP to incorporate scientific information regarding climate change and sea level rise (e.g., predictions, habitat management/acquisition efforts to enhance resilience to inundation) on their websites and to work with other government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

100.4.0.3 Develop policies for mandatory buffer strips on preserved farmlands and state-owned agricultural lands.

100.4.0.4 Create a policy that requires the use of CHANJ mapping for both regulatory use when conducting project reviews and planning/siting new or expanded rights-of-way projects. CHANJ mapping will assist in identifying SGCN habitats to avoid and/or where impact minimization strategies will likely be required.

100.4.0.5 Create a policy that requires an initial and subsequent updates of a comprehensive marine submerged aquatic vegetation mapping for use by NJ DEP's coastal regulatory program.

100.4.0.6 Create legislation or policy that identifies River Herring/Alewife as a stock in the fishery thereby requiring its own Atlantic State Marine Fisheries management plan.

100.4.0.7 Develop a law and/or policy that requires NJ DEP to continue to address and correct the allowable combined sewer overflow inputs of solid waste into the marine environment to minimize harm to wildlife and their habitats.

100.4.0.8 Develop a white paper addressing the impacts that existing, new or expanded rights-of-way have upon wildlife, wildlife habitats and habitat connectivity.

Level 1	Level 2	Level 3	**Level 4: NJ-specific Conservation Action Statements**

100.4.0.9 Develop and implement policies to minimize the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats in order to benefit wildlife.

100.4.0.10 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.4.0.11 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.4.0.12 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.4.0.13 Develop policies for different circumstances (e.g., roadsides and medians, riparian, aquatic and terrestrial habitats) that outline appropriate habitat/vegetation management strategies and schedules to minimize risks to and benefit wildlife.

100.4.0.14 Develop policies to facilitate agreements between eligible entities to manage appropriate conserved lands for grassland-dependent species, and to have access to/obtain restoration funds.

100.4.0.15 [*Reserved**]

100.4.0.16 Develop policies to implement habitat management strategies that will increase the structural diversity surrounding areas used for energy, mining, and transportation and service corridors which include but are not limited to the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides.

100.4.0.17 Develop policies to implement habitat management strategies, including prescribed burns, that will increase the structural diversity on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies to control and reduce the impacts of invasive, non-native species in order to increase structural habitat diversity.

100.4.0.18 Develop policies to minimize the extent of infrastructure associated with energy and service corridors or areas (e.g., wind and solar farms, pipelines, utility lines) and that require the implementation of habitat management strategies that will increase the structural diversity in the area including (e.g., the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides).

100.4.0.19 Develop regulations that will minimize the creation of new barriers, remove or replace current barriers with appropriately-sized systems to accommodate wildlife dispersal, and to minimize road widening and traffic volume increases within critical wildlife habitat areas.

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

---

* "Reserved" indicates placeholders for future edits or additions.

Level 1	Level 2	Level 3	**Level 4: NJ-specific Conservation Action Statements**
			100.4.0.21 Ensure that Section 303(d) of the Clean Water Act and applicable State statutory/regulatory requirements for surface water pollutant budgets are being met by monitoring and enforcing regulatory Total Maximum Daily Load (TMDL) targets established within regional Water Quality Management Plans.
			100.4.0.22 Work with NJ DEP's Division of Land Use Regulation to ensure protection of listed species and their habitats during stream cleaning events.
			100.4.0.23 Adopt additional timing restrictions, and any necessary permit conditions, into the Administrative Code for NJ DEP-permitted projects to minimize impacts on freshwater SGCN fish, in particular, within habitats during their vulnerable periods as identified through a thorough review of available information.
			100.4.0.24 Develop policies to provide financial support for the New Jersey Invasive Species Strike Team.
			100.4.0.25 Develop policies and/or regulations that require permit applicants and reviewers to assess the impacts of proposed projects with consideration to the cumulative and synergistic effects over time and over a larger spatial scale beyond the project site.

This page intentionally left blank

NJ State Wildlife Action Plan, 2017

Threats and Conservation Actions
for
Focal Species of Greatest Conservation Need

NJ Department of Environmental Protection
Division of Fish and Wildlife
March 28, 2018

NEW JERSEY DIVISION OF
Fish and Wildlife

Table of Contents

Page

Introduction J-1
Report Format and Information J-1

Conservation Targets

Mammals J-3
- Allegheny Woodrat J-3
- Cave-hibernating Bats J-28
- North Atlantic Right Whale J-64

Birds J-82
- Beach nesting birds J-82
- Forest birds J-119
- Grassland birds J-158
- Marsh birds J-195
- Migrant shorebirds J-235
- Northern Harrier J-263
- Peregrine Falcon J-292
- Pied-billed Grebe J-308
- Red-headed Woodpecker J-336
- Young forest birds J-370

Reptiles and Amphibians J-411
- Bog Turtle J-411
- Eastern Box Turtle J-454
- Eastern Hognose Snake J-498
- Eastern Redbelly Turtle J-538
- Longtail Salamander J-581
- Marine turtles J-627
- Northern Black Racer J-652
- Northern Diamondback Terrapin J-692
- Northern Red Salamander J-735
- Pine Barrens snakes J-780
- Timber Rattlesnake J-821
- Vernal pond/pond breeders J-870
- Wood Turtle J-917

Fish J-966
- Anadromous & Semi-anadromous fish J-966

Brook Trout J-1001
Pinelands freshwater fish J-1048
Vulnerable minnows J-1095

Macroinvertebrates J-1142
Arogos Skipper J-1142
Beach tiger beetles J-1176
Bumble bees J-1206
Dotted Skipper J-1240
Freshwater mussels J-1274
Frosted Elfin J-1308
Georgia Satyr J-1342
Hoary Elfin J-1375
Leonard's Skipper J-1408
Maritime Sunflower Borer Moth J-1442
New Jersey Pine Barrens Tiger Beetle J-1476
Northern Metalmark J-1508
Papaipema harrisii J-1541
Pinelands moths J-1574
Pond odonates J-1607
Robust Baskettail J-1645
Septima's Clubtail J-1683
Superb Jewelwing J-1721

Introduction

New Jersey's wildlife face a multitude of threats can adversely affect their habitats, persistence, and well-being. This report provides an extensive and detailed list of such threats and action drivers, as well as the conservation actions necessary to alleviate the adverse impacts these conditions create. The report was generated using a complex database developed and maintained by the NJ Division of Fish and Wildlife.

Plan users should consider this information when developing or adapting conservation projects they wish to undertake. Conservation projects are more likely to succeed if they are developed with an understanding of the causes for species' declines and designed to take specific and meaningful actions to address the causes. To that end, partner conservation organizations have already prepared a number of species-based plans that also provide useful conservation guidance. We have referred to many of these plans in the report, *Profiles of the Focal Species of Greatest Conservation Need*, found in Appendix D.

Report Format and Information

The report is organized by taxonomic class listed in order of taxonomic sequence (i.e., mammals, birds, reptiles and amphibians, fish, and invertebrates). Within each class, New Jersey's 48 "conservation targets" are listed in alphabetical order. As described in Chapter 1, each of the 48 conservation targets consist either of an individual or a group of "focal species of greatest conservation need" (Focal SGCN) categorized as "targets" based on the species sharing common habitats, ecological requirements, and/or conservation needs. For example, because bobolinks, Eastern meadowlarks, grasshopper sparrows, and Vesper sparrows share common habitats and face common threats that can be addressed using the same conservation actions. These species are presented together as the conservation target, Grassland Birds. The same applies for many other Focal SGCN, such as Anadromous and Semi-anadromous Fish and Pinelands Moths.

As described in the Introduction, Section IV (*2017 Changes to NJ's State Wildlife Action Plan*) and Chapter 3 of this plan, threats and action drivers are defined and categorized using the three-level lexicon of threats developed by the International Union for Conservation of Nature (IUCN) and action drivers developed by the U.S. Fish & Wildlife Service for their database, Tracking and Reporting on Actions for Conservation of Species (TRACS). Conservation actions are also defined and categorized using the three-level lexicon of conservation actions developed for TRACS. In addition, New Jersey chose to develop an even finer fourth level of threats/action drivers and conservation actions that are specific to New Jersey.

This report provides the following information for New Jersey's 48 conservation targets:

1. A list of species that make up the conservation target group.
2. A listing of threat and action driver categories (levels 1 through 3 as identified by IUCN and TRACS, respectively) that apply to the conservation target. The report also provides New Jersey-specific, level 4 threat/action driver statements. Note that in association with each "level 3" threat/action driver statement, the report also provides the average threat severity score (i.e., impact rating). The threat severity score is an indicator of the impact each level 3 threat/action driver has on the Focal SGCN (more details are provided in Chapter 3). Where conservation targets consist of multiple Focal SGCN (e.g., Cave-hibernating Bats), the average severity score for the group is presented.
3. A list of conservation action categories (levels 1 through 3 as identified in TRACS). Note that in association with each level 3 threat statement, the report also provides the New Jersey-specific, level 4 conservation action statements.

This Plan explicitly focuses on the development and implementation of actions to conserve New Jersey's wildlife species of conservation need (SGCN) and the habitats on which they depend. However, New Jersey also supports an extraordinarily diverse flora, described in Chapter 3, Section VI, including natural communities that provide significant habitat for wildlife SGCN and associated rare plants.

The actions, projects, and monitoring programs presented in this plan for wildlife also provide an opportunity to contribute to the conservation of rare plants and natural communities. At the same time, without proper precautions, actions directed at enhancing wildlife, especially "on-the-ground" actions that modify habitats, may pose risks to rare native flora. As such, it is important that land and wildlife managers consider plant communities when implementing conservation actions and monitoring programs for wildlife. Additional guidance for integrating rare plants and natural communities into wildlife planning and action implementation is presented in Attachment IV.

Mammals

Allegheny Woodrat

Focal species that comprise this Conservation Target:

Allegheny Woodrat

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:
- 1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.1.1.2 Loss, alteration and/or degradation of habitat.
- 1.1.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:
- 1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.2.1.2 Loss, alteration and/or degradation of habitat.
- 1.2.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats:
- 1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

3 Energy Production and Mining

3.1 Oil and Gas Facilities and Pipelines

3.1.1 Distribution processes of petroleum and other liquid hydrocarbons (Avg. Score: 1.00)

NJ Specific Threats:
- 3.1.1.1 Fragments terrestrial and aquatic habitats.
- 3.1.1.2 Loss, alteration and/or degradation of habitat.
- 3.1.1.3 Increased risk of oil spills.
- 3.1.1.4 Increased noise pollution.
- 3.1.1.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.

3.1.2 Natural gas distribution processes (Avg. Score: 1.00)

NJ Specific Threats:
- 3.1.2.1 Fragments terrestrial and aquatic habitats.
- 3.1.2.2 Loss, alteration and/or degradation of habitat.

3.1.2.3 Increased risk of gas leaks and explosions.

3.1.2.4 Increased noise pollution.

3.1.2.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.

3.2 Mining and Quarrying

3.2.2 Surface Mining - Rock Quarry (and sand quarries) (Avg. Score: 1.00)

NJ Specific Threats:

3.2.2.1 Fragments terrestrial and aquatic habitats.

3.2.2.2 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

3.2.2.3 Increased risk of vehicle strikes/mortality to wildlife.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats:

4.1.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species and inhibiting dispersal of non-volant animals, reducing gene flow.

4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.1.2 Movement of cars and other vehicles on roads and railroads (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats:

4.1.2.1 Increased vehicle traffic increases the risk of wildlife mortality from strikes.

5 Biological Resource Use

5.1 Hunting and Collecting Terrestrial Animals

5.1.3 Persecution/Control (Avg. Score: 1.00)

NJ Specific Threats:

5.1.3.1 Wanton killing of perceived dangerous and/or undesirable animals.

5.2 Gathering Terrestrial Plants

5.2.3 Control (Avg. Score: 1.00)

NJ Specific Threats:

5.2.3.2 Clearing of scrub-shrub vegetation [and snags] diminishes cover and nesting habitat.

5.3 Logging and Wood Harvesting

5.3.1 Intentional Use (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats:

5.3.1.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.1.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.1.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.4 Unintentional effects (large scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.4.5 Lack of appropriate, sustainable forest management can lead to a decrease in forest habitat diversity, degraded habitat for many forest species, the loss of habitat for early-successional species, and/or the loss of unique habitats for species that need canopy breaks and multi-aged tree composition to fulfill various life history requirements.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.6 Recreational use of cliffs, rocks and ridgelines (Avg. Score: 1.00)

NJ Specific Threats: 6.1.6.1 Recreational rock-climbing and rock-scrambling can cause reduced reproductive success or reproductive failure for wildlife by disrupting normal reproductive behaviors and/or reduce breeding success by forcing them into suboptimal habitats.

6.1.6.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

7 Natural Systems Modifications

7.1 Fire and Fire Suppression

7.1.2 Suppression of Fire Frequency/Intensity (Avg. Score: 2.00)

NJ Specific Threats: 7.1.2.1 Shift in vegetative communities as a result of suppression of natural fires.

7.1.2.2 Lack of diversity in age structure and composition of vegetation due to the suppression of fire.

7.2 Dams and Water Management/Use

7.2.12 Culverts (Avg. Score: 1.00)

NJ Specific Threats: 7.2.12.1 Improper design, placement, installation and maintenance of culverts and other stream crossing structures can impede or prevent the movements of terrestrial organisms and can restrict or limit stream flow, impeding the movement of aquatic organisms along riparian corridors.

7.3 Other Ecosystem Modifications

7.3.4 Lack of natural disturbance patterns or ecosystem functions due to species loss (Avg. Score: 1.00)

NJ Specific Threats: 7.3.4.5 The lack of forest disturbance minimizes the diversity of herbaceous vegetation and other shrubs and trees that need a lot of sunlight to grow.

7.3.5 Poor habitat management (Avg. Score: 2.00)

NJ Specific Threats: 7.3.5.12 Lack of diversity in age structure and composition of vegetation due to lack of natural disturbances and/or vegetation management.

7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.5 Invasive non-native terrestrial/wetland plants (Avg. Score: 1.00)

NJ Specific Threats: 8.1.5.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.6 Invasive non-native fungal/bacterial diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.1.6.1 The introduction of non-native fungal and bacterial diseases threatens native populations and ecosystems.

8.2 Problematic Native Species/Diseases

8.2.2 Named Species (Avg. Score: 3.00)

NJ Specific Threats: 8.2.2.2 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.5 Viral/Prion-induced Diseases

8.5.2 Named Species (Disease) (Avg. Score: 1.00)

NJ Specific Threats: 8.5.2.1 Diseases such as West Nile Virus, arenavirus, sudden oak death, Avian Influenza, and snake fungal disease cause morbidity or mortality to native populations.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.3 Agricultural and Forestry Effluents

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture (Avg. Score: 1.00)

NJ Specific Threats: 9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.4 Garbage and Solid Waste

9.4.1 Direct hazards to wildlife (Avg. Score: 1.00)

NJ Specific Threats: 9.4.1.1 Wildlife may ingest garbage causing choking or impingement in the digestive system, or they may become physically entangled in it (e.g., plastic or abandoned fish nets); conditions that make them unable to feed or drink, cause them to suffocate or drown, or otherwise restrict the animal's movement making them more susceptible to predators, starvation or injury.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 1.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.2 Droughts

11.2.1 Droughts (Avg. Score: 1.00)

NJ Specific Threats: 11.2.1.4 Increase stress on vegetation making them more susceptible to pest damage.

11.4 Storms and Flooding

11.4.2 Increased rainfall (Avg. Score: 1.00)

NJ Specific Threats: 11.4.2.2 Extreme rain events can damage wildlife nesting and resting habitats, including impacts to avian eggs and chick and small mammal survivorship.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 3.00)

NJ Specific Threats: 12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.2 Lack of up-to-date existing information (Avg. Score: 3.00)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.3 Need to answer research question (Avg. Score: 3.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.4 Need to develop new technique (Avg. Score: 2.00)

NJ Specific Threats: 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 1.00)

NJ Specific Threats: 12.3.0.1 Regulatory habitat protections within state land use regulations are spatially limited to specific geographic areas (e.g., Pinelands, Coastal Area) or geographic features (e.g., wetlands, streams) and so fail to protect critical habitats that exist outside of these regulated areas.

12.3.0.3 Lack of a licensing program and standards for NJ Nuisance Wildlife Control Operators (NWCOs) leads to inadequate controls over handling of wildlife and lack of reporting of non-game/SGCN species (and all wildlife) encountered in nuisance situations.

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.9 Prescribed burns implemented by the NJ Forest Fire Service are constrained by State air quality regulations to a timeframe where seasonal weather conditions are less than ideal for effective burning. As a result, the Forest Fire Service is limited in the number of overall prescribed burns it can implement to restore habitat for wildlife.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 2.00)

NJ Specific Threats: 12.4.0.5 Bureau of Forest Fire Management policy has traditionally implemented prescribed burns on State lands for the sole purpose of public safety (i.e., addressing hazard fuel reduction), missing opportunities to burn in a manner that would additionally manage habitat for ecological diversity.

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 2.00)

NJ Specific Threats: 14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 2.00)

NJ Specific Threats: 14.2.1.1 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various forest management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 3.00)

NJ Specific Threats: 15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.4 Secure and promote the protection, restoration, and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.9 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing Forestry Stewardship Programs.

1.2.1.14 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of herbicides and pesticides, and implementing more ecologically safe strategies when using such products.

1.2.1.15 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of rodenticides, and implementing more ecologically safe strategies when using such products.

1.2.1.20 Coordinate across government agencies and non-government organizations to create or expand upon tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMP's.

2 Direct Management of Natural Resources

2.3 Fire management

2.3.3 Prescribed burning

2.3.3.1 Evaluate different management techniques of prescribed burns that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

2.3.3.2 Conduct prescribed burning in Northern New Jersey forests to maintain and regenerate a mosaic of upland forest habitats.

2.3.3.3 Conduct prescribed burning to improve wildlife habitat.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.2 Improve the availability of prey/food resources through terrestrial and aquatic plantings and habitat restoration for SGCN populations, in particular for those populations thought to be limited due wholly or in part to a lack of (or contaminated) food resources, and for migratory species (birds, bats, invertebrates).

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.8 Protect significant natural and/or unique communities by implementing best management practices when conducting habitat restoration strategies.

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.15 Restore and/or enhance terrestrial and aquatic habitats proximate to but not adjacent to roads and other transportation corridors for terrestrial-bound SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.10.0.24 Use NJ's CHANJ mapping and guidance to establish vegetation and enhance or create corridors between fragmented habitats with similar vegetation, slope, soils, structure, etc. to ensure vegetative integrity is maintained to allow wildlife to safely disperse, and corridors are buffered with natural habitats to minimize disturbance to wildlife within the corridors.

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.11.0.3 Create suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats through vegetation management.

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through vegetation management.

2.11.0.6 Reclaim degraded rare species habitats by conducting vegetation management needed to restore habitat value for the documented/target SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.13 Implement best management practices (BMPs), protective strategies, and guidelines for vegetation management to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.11.0.14 Conduct vegetation management adjacent to roads for SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.11.0.17 Implement vegetation management strategies to improve the availability of prey/food resources for SGCN whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources.

2.11.0.23 Implement appropriate habitat management actions in areas where natural disturbances, such as wildfire, have been precluded.

2.11.0.26 Conduct vegetation management along roadsides and medians, avoiding peak activity periods for wildlife, that enhances wildlife dispersal naturally and safely across roads and similar barriers to/between terrestrial and/or aquatic habitats.

2.11.0.31 In areas where vegetative communities are shifting due to fire suppression and controlled burns are not feasible, manage vegetation to improve wildlife habitat.

2.11.0.33 Increase structural habitat diversity by implementing long-term vegetation management to minimize the potential for the establishment of invasive and/or non-native plants that may outcompete native vegetation.

2.11.0.37 Increase structural habitat diversity by minimizing the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats which benefits wildlife.

2.11.0.40 Increase structural habitat diversity surrounding areas used for energy, mining, and transportation and service corridors by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides, and avoid managing habitat during the breeding seasons for ground-nesting birds, reptiles, amphibians and small mammals.

2.11.0.41 Increase structural habitat diversity through the implementation of a variety of vegetation management practices such a prescribed burns (either increasing or decreasing their frequency depending on the site and objective), plantings, etc. that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.43 Manage forests to increase variation in age structure and composition using BMPs that promote and maintain functioning ecological forest-based systems and biological diversity.

2.13 Wildlife damage management

2.13.0 Nuisance fish and wildlife damage

2.13.0.8 Implement and assess management strategies to control and reduce the impacts of detrimental species and diseases that pose threats to native wildlife or communities.

2.14 Wildlife disease management

2.14.0 Wildlife disease strategy development and investigation

2.14.0.1 Investigate diseases/pathogens impacting SGCN and/or their habitats.

2.14.0.2 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

2.14.0.4 Conduct long-term monitoring of diseases in vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts.

2.14.0.5 Assess the impacts of diseases on the life cycles of wildlife.

2.14.0.6 Distribute antihelminthic drugs targeting raccoon roundworm in raccoons proximal to Allegheny woodrat populations and/or implement a raccoon control strategy.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.6 Conduct long-term studies on resident and migratory SGCN to determine if there are changes to the populations' demography (productivity, survival, dispersal) and/or to their critical and/or supporting habitats (i.e., diminishing in value, acreage or connectivity, etc.), in particular changes that would not maintain SGCN at viable levels for species populations. Update data and GIS maps; provide updated information to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.9 Identify SGCN (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources, and compile/collect and evaluate data/information regarding potential management strategies to improve the availability of such SGCN's food resources.

3.0.0.10 Conduct long-term studies to evaluate the effectiveness of management strategies implemented to enhance food/prey availability for SGCN [whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources] through studies that investigate the populations and health of the food resources as well as the target SGCN. Revise management strategies as needed and continue to monitor the effectiveness of the efforts.

3.0.0.11 Develop, implement and evaluate the effectiveness of town plans that avoid impacts to SGCN species and their habitats.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.14 Identify areas with invasive, aquatic plants and animals and collect a detailed baseline assessment of the species' status and distribution. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort. Researchers and contractors performing Forest Stewardship Inventories and/or Plans on state lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.0.0.15 Conduct long-term monitoring of areas identified as having invasive, aquatic plants and animals to track the species' status/progress over time with or without the implementation of management strategies. Areas without management strategies should be assessed and prioritized for management/control. Areas where management strategies are being implemented should include an assessment of the management effort and identify/recommend and implement necessary changes to improve its success. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort.

3.0.0.26 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species including objectives and guidance pertaining to and the condition/status of critical and supporting habitats.

3.0.0.27 Evaluate the effectiveness of strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals through research and monitoring. Develop and provide NJ DEP and other appropriate governing agencies/commissions a summary of findings and recommendations to improve such efforts.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.2 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.0.8 Implement and conduct long-term monitoring of control measures aimed at minimizing the impacts of problematic species and/or diseases to evaluate the effectiveness of such efforts and to identify and incorporate additional strategies as appropriate.

3.2.0.9 Maintain an inventory of invasive insect distribution and where they exist, conduct long-term monitoring of habitat conditions to assist in developing strategies to combat the impacts to SGCN habitats. Report potential infestations to NJ DEP.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.2 Age, size and sex structure

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.3 Baseline inventory

3.2.3.6 Investigate the feasibility and potential for success of conducting genetic rescue through translocation and/or reintroduction of animals into suitable habitat that was historically occupied to increase genetic diversity and reconnect isolated populations. Methods of investigation should include, but are not limited to, thorough literature reviews, expert opinions, identifying potential pitfalls (e.g., species' fidelity to their range or critical areas), and an examination of historic and current SGCN population distribution and suitable habitat availability.

3.2.4 Food habits

3.2.4.1 Monitor and investigate the populations and health of SGCN prey/food resources for those SGCN whose populations are thought to be limited due wholly or in part to a lack of food resources or toxins in food resources.

3.2.5 Genetics

3.2.5.1 Investigate the feasibility and potential for success of conducting genetic rescue through translocation and/or reintroduction of animals into suitable habitat that was historically occupied to increase genetic diversity and reconnect isolated populations. Methods of investigation should include, but are not limited to, thorough literature reviews, expert opinions, identifying potential pitfalls (e.g., species' fidelity to their range or critical areas), and an examination of historic and current SGCN population distribution and suitable habitat availability.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.6 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) that could, through revegetation and/or enhancement efforts, become suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN.

3.3.1.9 Inventory forests throughout northern New Jersey to develop a baseline characterization of the structure and composition of habitats and identify deficient forest habitat types.

3.3.1.18 Conduct an assessment using available data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels.

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.2 Monitoring

3.3.2.1 Evaluate the effectiveness of forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.9 Investigate the effectiveness of various silviculture techniques for enhancing forests for forest-dependent SGCN.

3.3.2.10 Evaluate the efficacy and success of different management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.3.2.15 Investigate the effectiveness of management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.3.2.20 Once a system is developed for reporting and qualifying new locations of invasive species, develop, implement and monitor/evaluate invasive species removal strategies at identified locations. Priority should be given to those areas critical to SGCN and/or contain unique and/or rare plant communities supporting SGCN and/or other fish/wildlife species.

3.3.2.24 Conduct regular inventories of forests throughout northern New Jersey to characterize the changing structure and composition of habitats and monitor forest conditions.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.2 Develop management strategies to improve the availability of prey/food resources for SGCN whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources. Monitor and investigate the management strategies over time to determine success and/or the need to revise methods.

3.5.3.3 Develop/improve management techniques that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.7 Develop/improve forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

3.5.3.8 Develop best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5.3.9 Develop strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.14 Develop aquaculture practices in the coastal areas that are compatible with the recovery of SGCN.

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.3.16 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.3.20 Develop guidance on various silviculture techniques for enhancing forests for forest-dependent SGCN.

3.5.3.21 Develop management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.24 Based on research, modify management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.1 Develop studies to evaluate management strategies to improve the availability of prey/food resources for SGCN whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources. Monitor and investigate the management strategies over time to determine success and/or the need to revise methods.

3.5.4.5 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

3.5.4.7 Investigate the feasibility and potential for success of conducting genetic rescue through translocation and/or reintroduction of animals into suitable habitat that was historically occupied to increase genetic diversity and reconnect isolated populations. Methods of investigation should include, but are not limited to, thorough literature reviews, expert opinions, identifying potential pitfalls (e.g., species' fidelity to their range or critical areas), and an examination of historic and current SGCN population distribution and suitable habitat availability.

3.5.4.13 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.4.14 Develop and implement agreements, and update existing agreements, with government agencies regarding the protection of critical SGCN habitats (e.g., significant breeding populations of beach nesting birds, colonial waterbird nesting areas, bat colonies, etc.).

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.17 Investigate new, non-invasive techniques for SGCN population evaluation through literature review, expert opinion, trial studies (if low risk), etc.

3.5.4.18 Investigate the effectiveness of survey techniques through selected “ground truthing” and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.6 Secure and protect old-growth forest stands with large trees and/or stands that are approaching or being actively managed for old growth forests, in particular those within large, contiguous forest tracts, through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.6 Promote the protection of old-growth forest stands with large trees and/or stands that are approaching or being actively managed for old growth forests, in particular those within large, contiguous forest tracts, through conservation area designations.

6.4 Private lands agreements

6.4.0 Private land agreement strategies

6.4.0.1 Enter into private lands agreements to expand control burns on private lands, in particular those adjacent to conserved lands to improve SGCN habitats.

7 Law Enforcement

7.1 Law enforcement

7.1.3 Sub-national Level

7.1.3.2 Increase the number of law enforcement officers tending to wildlife issues to a reasonable number to sufficiently cover the State and marine waters.

7.1.4 Scale Unspecified

7.1.4.6 Recruit law enforcement to assist in the protection and enhancement of SGCN populations, in particular endangered species, through improved awareness of species through trainings, partnerships, and other methods. Information should include but is not limited to: 1) Issues concerning illegal collection of reptiles, 2) Persecution of rare snakes, 3) Illegal recreational activities on public lands (e.g., off-road vehicles) and their impact on wildlife, 4) Identification of sensitive areas, critical sites and/or "hot-spots" for collection.

7.1.4.7 Increase law enforcement presence to enforce regulations governing recreational activities (e.g., the use of personal watercraft and off road vehicles, caving, rock climbing, etc.) on conserved lands and within other sensitive habitats, and discourage activities that cause harm or disturbance to vegetation, wetlands, fish and wildlife.

7.1.4.9 Implement policies that improve and secure habitat connections between conserved SGCN habitats.

7.1.4.10 Implement policies that promotes expanding acreages and enhances the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.14 Implement policies that protect existing and developing old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

7.1.4.23 Implement policies that minimize wildlife road mortality.

7.1.4.24 Implement protective measures to benefit urban-associated SGCN such as restricting human access, buffering sensitive areas with postings, noise and/or light restrictions in sensitive areas and/or during sensitive periods such as breeding, etc.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.1.0.4 Engage government agencies, conservation partners and other stakeholders in constructive dialogues encouraging them to influence policy change and the creation of incentives through a habitat bill and/or municipal ordinances for backyard habitat.

8.1.0.18 Engage NJDOT, NJ Transit Authority and other road management entities, wildlife conservation organizations/agencies (e.g., Division of Fish and Wildlife, New Jersey Conservation Foundation, Conserve Wildlife Foundation of NJ), and communities and citizens in discussions regarding the importance of and methods to enhance habitat connectivity, and work together to develop feasible strategies for ensuring that wildlife can disperse naturally and safely across roads and similar barriers to terrestrial and/or aquatic habitats.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.26 Coordinate across federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to woodland landowners to adopt or endorse consistent best management practices concerning controlled burns to maintain and/or improve forested habitat for wildlife.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.34 Work with the NJ Education Association and Department of Education to design curriculum and outdoor experimental learning opportunities, and provide training to teachers on implementation of these activities.

8.1.0.37 Enlist landowners and NJ citizens in the protection of and survey efforts for SGCN, in particular rare species, by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management and wildlife-related volunteer programs.

8.1.0.38 Engage partners, stakeholders and land managers in constructive dialogue promoting forest stewardship for SGCN that use core forests and forested corridors.

8.1.0.40 Encourage researchers, land managers, naturalists and enthusiasts to follow proper procedures for the coordination and/or permitting of research/management activities involving wildlife and sensitive habitats, and discourage activities that alter vegetation or wetlands, or cause harm or disturbance to wildlife.

8.1.0.44 Engage conservation partners, stakeholders, government agencies and other land stewards in constructive dialogues encouraging their inclusion of controlled burns in forest and other stewardship plans.

8.1.0.48 Form cooperative partnerships with transportation and shipment agencies and companies to facilitate habitat creation and enhancement away from and outside of project areas and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.8 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate recreationists and encourage landowners to eliminate garbage in the vicinity of suitable wildlife habitat, in particular SGCN habitat. Information should include the detrimental impacts garbage may have on various wildlife species.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.31 Develop an educational outreach program for landowners and citizens on the secondary impacts of rodenticides on predators and scavengers.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.5 Develop a plan that directs the creation or expansion of energy or utility rights-of-way in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.15 Develop a plan to minimize fragmentation of terrestrial and aquatic habitats by roads.

9.1.0.16 Develop a plan to minimize new lawnscapes and preserve natural vegetation within and adjacent to critical forest areas.

9.1.0.18 Develop a plan to minimize the effects of road widening and traffic volume increases within critical wildlife habitat areas using CHANJ products.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.23 Develop a plan to mitigate the effects of transportation barriers by using CHANJ products.

9.1.0.27 Develop a plan to use wildlife-appropriate culverts in critical forested areas.

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.2 Develop a management plan to improve the availability of prey/food resources for SGCN whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources.

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.5 Develop response plans to address disease outbreaks within wildlife populations, in particular SGCN.

9.3.1.7 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.10 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.14 Create species management plans that will promote the protection and where appropriate, the development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

9.3.2 Listed species recovery planning

9.3.2.1 Develop proactive species recovery plans for all endangered and threatened species including guidance and objectives pertaining to critical and supporting habitat to meet and maintain recovery goals.

9.3.3 Habitat management planning

9.3.3.1 Develop a management plan to improve the availability of prey/food resources for SGCN whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources.

9.3.3.5 Develop a management plan using forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

9.3.3.6 Develop a management plan for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

9.3.3.8 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.16 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.21 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.3.22 Create management plans to minimize and/or prevent wildlife road mortality that will incorporate wildlife passages in conjunction with barrier fencing and, where possible, seasonal closures. Aquatic-associated passages must avoid disturbance to the natural streambeds and riparian habitat, permit high volumes of water to flow freely, and provide adequate travel corridors for terrestrial wildlife, while maintaining stream flow for fish passage. Bridges that span rivers and streambeds and include floodplain habitat on either side of the span to provide travel corridors for terrestrial wildlife are preferred over culverts.

9.3.3.34 Include controlled burn prescriptions in forest and stewardship plans to improve wildlife habitat.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.10 Use CHANJ mapping in reviews of proposed energy, mining, transportation and utility service companies/agencies' projects to attempt to maintain habitat connectivity and reduce fragmentation, and identify potential impacts of the projects.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.4 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the secondary impacts of rodenticides on predators and scavengers.

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.7 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on the importance of maintaining habitat connectivity, minimizing fragmentation, and the use of CHANJ products to help them target areas for such planning.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.16 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

11.2.0.23 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to SGCN habitats to promote the protection and/or enhancement of those adjacent habitats to increase the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and that connect conserved SGCN habitats.

11.2.0.25 Provide educational resources, training programs, and on-the-ground guidance to resource managers regarding the assessment of and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) related to residential and commercial development.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

100 Law and Policy

100. Legislation

100.1.3 Sub-national Level

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.4 County and Local

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.3 Expand the acreages and enhance the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN through local ordinances.

100.1.4.13 Encourage municipal laws regulating domestic pets that may predate on wildlife.

100.1.4.14 Adopt/pass local ordinances which require assessing and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.5 Develop policies that will promote improved and secure habitat connections between conserved SGCN habitats.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.20 Develop policies and/or regulations that prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

100.3.0.21 Develop policies that minimize wildlife road mortality through: 1) Requiring the integration of wildlife passages into all new and repaired roads, in particular those areas that will connect SGCN habitats, 2) Requiring current fish/wildlife passages be improved and maintained in perpetuity, 3) Supporting seasonal road closures, in particular for unimproved roads, 4) Supporting projects that work to improve connectivity of SGCN habitats such as land conservation through acquisition or other means.

100.3.0.31 Create or expand tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMPs.

100.3.0.32 Coordinate regulations across agencies to maximize availability of and enrollment in existing Forestry Stewardship Programs (e.g., "Woodland Stewards", Farm Bill, partners, etc.) to maintain and/or improve forest habitat.

100.3.0.36 Create legislation to limit the amount of plastic from shopping bags in circulation and re-instate incentives for citizens bringing their own shopping bag to grocery store.

100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.45 Increase the controlled burn season to focus on restoring vegetative communities.

100.3.0.57 Develop regulations that when implemented will improve and secure habitat connections between conserved SGCN habitats.

100.3.0.58 Develop regulations that when implemented will promote the expansion of acreages and enhancement of the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.69 Develop regulations that when implemented will minimize wildlife road mortality.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.2 Create a policy that requires the NJ DEP to incorporate scientific information regarding climate change and sea level rise (e.g., predictions, habitat management/acquisition efforts to enhance resilience to inundation) on their websites and to work with other government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

100.4.0.13 Develop policies for different circumstances (e.g., roadsides and medians, riparian, aquatic and terrestrial habitats) that outline appropriate habitat/vegetation management strategies and schedules to minimize risks to and benefit wildlife.

100.4.0.19 Develop regulations that will minimize the creation of new barriers, remove or replace current barriers with appropriately-sized systems to accommodate wildlife dispersal, and to minimize road widening and traffic volume increases within critical wildlife habitat areas.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Cave-hibernating Bats

Focal species that comprise this Conservation Target:

Indiana Bat | Little Brown Bat | Northern Myotis

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 1.67)

NJ Specific Threats:
- 1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.1.1.2 Loss, alteration and/or degradation of habitat.
- 1.1.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.
- 1.1.1.5 Impervious surfaces can lead to a decrease in water recharge.
- 1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.1.2 Residential development using materials that cause collision hazards (Avg. Score: 1.00)

NJ Specific Threats:
- 1.1.2.1 Collision risk to volant species (birds, bats and invertebrates).

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 1.67)

NJ Specific Threats:
- 1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.2.1.2 Loss, alteration and/or degradation of habitat.
- 1.2.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.
- 1.2.1.5 Impervious surfaces can lead to a decrease in water recharge.
- 1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.2.2 Commercial development using materials that cause collision hazards (Avg. Score: 1.00)

NJ Specific Threats:
- 1.2.2.1 Collision risk to volant species (birds, bats and invertebrates).

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 1.67)

NJ Specific Threats:
- 1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.3.1.2 Loss, alteration and/or degradation of habitat.
- 1.3.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.
- 1.3.1.4 Impervious surfaces can lead to a decrease in water recharge.
- 1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.3 Agro-industry (Avg. Score: 1.00)

NJ Specific Threats:
- 2.1.3.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.
- 2.1.3.2 Fragments terrestrial and aquatic habitats.

2.2 Wood and Pulp Plantations

2.2.1 Small Holder (Avg. Score: 1.00)

NJ Specific Threats:
- 2.2.1.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.
- 2.2.1.2 Tree harvesting can cause direct mortality to wildlife, especially if done during peak activity periods or vulnerable life stages (e.g., denning, nesting, gestation/birthing, basking, roosting, pre-volancy, etc.).

2.2.2 Agro-industry Plantations (Avg. Score: 1.00)

NJ Specific Threats:
- 2.2.2.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.
- 2.2.2.2 Tree harvesting can cause direct mortality to wildlife, especially if done during peak activity periods or vulnerable life stages (e.g., denning, nesting, gestation/birthing, basking, roosting, pre-volancy, etc.).

2.3 Livestock Farming and Ranching

2.3.2 Small-holder Grazing (Avg. Score: 1.00)

NJ Specific Threats:
- 2.3.2.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.
- 2.3.2.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.3 Agro-industry Grazing (Avg. Score: 1.00)

NJ Specific Threats:
- 2.3.3.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.
- 2.3.3.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

3 Energy Production and Mining

3.1 Oil and Gas Facilities and Pipelines

3.1.1 Distribution processes of petroleum and other liquid hydrocarbons (Avg. Score: 1.00)

NJ Specific Threats:
- 3.1.1.1 Fragments terrestrial and aquatic habitats.
- 3.1.1.2 Loss, alteration and/or degradation of habitat.
- 3.1.1.4 Increased noise pollution.

3.1.2 Natural gas distribution processes (Avg. Score: 1.00)

NJ Specific Threats:
- 3.1.2.1 Fragments terrestrial and aquatic habitats.
- 3.1.2.2 Loss, alteration and/or degradation of habitat.
- 3.1.2.4 Increased noise pollution.

3.2 Mining and Quarrying

3.2.2 Surface Mining - Rock Quarry (and sand quarries) (Avg. Score: 1.00)

NJ Specific Threats: 3.2.2.1 Fragments terrestrial and aquatic habitats.

3.2.2.2 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

3.3 Renewable Energy

3.3.1 Wind Power (Avg. Score: 1.00)

NJ Specific Threats: 3.3.1.1 Turbines, blades, and structure foundations create a collision risk to volant species (birds, bats and invertebrates) and marine animals.

3.3.1.2 Fragments terrestrial habitats.

3.3.1.3 Loss, alteration and/or degradation of habitat.

3.3.2 Solar Power (Avg. Score: 1.00)

NJ Specific Threats: 3.3.2.1 Fragments terrestrial habitats.

3.3.2.2 Loss, alteration and/or degradation of habitat.

3.4 Conventional Power Plants

3.4.0 Conventional Power Plants (Avg. Score: 1.00)

NJ Specific Threats: 3.4.0.2 Loss, alteration and/or degradation of habitat due to new or the expansion of current facilities.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.1.1.3 Re-establishment of abandoned railroad lines may displace wildlife, in particular, less mobile species using the area to fulfill critical life history requirements.

4.1.1.4 Re-establishment of abandoned railroad lines may increase the risk of direct mortality on wildlife.

4.1.2 Movement of cars and other vehicles on roads and railroads (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 4.1.2.1 Increased vehicle traffic increases the risk of wildlife mortality from strikes.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads (Avg. Score: 1.00)

NJ Specific Threats: 4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

4.2.1.5 Tall radio and utility towers with guy lines pose a strike hazard for migrant bats and birds, especially in poor visibility conditions (e.g., fog, nighttime, poor weather conditions).

4.2.2 Management of rights-of-way or communication tower facilities and/or their associated access roads (Avg. Score: 1.00)

NJ Specific Threats: 4.2.2.1 Improper or poorly scheduled vegetation management can cause direct mortality to and may reduce productivity of wildlife.

4.4 Flight Paths

4.4.1 Airplane flight paths (Avg. Score: 1.00)

NJ Specific Threats: 4.4.1.2 Increased risk of collision between airplanes and birds, bats and insects.

5 Biological Resource Use

5.1 Hunting and Collecting Terrestrial Animals

5.1.3 Persecution/Control (Avg. Score: 2.00)

NJ Specific Threats:
- 5.1.3.1 Wanton killing of perceived dangerous and/or undesirable animals.
- 5.1.3.2 Improper exclusion methods and/or timing can result in injury, death, or entrapment of bats in buildings.

5.3 Logging and Wood Harvesting

5.3.1 Intentional Use (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats:
- 5.3.1.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.
- 5.3.1.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.
- 5.3.1.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.
- 5.3.1.6 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices in Atlantic White Cedar stands may destroy a unique wildlife wetland habitat that is difficult, and takes time, to restore.

5.3.2 Intentional Use (large scale) (Avg. Score: 1.67)

NJ Specific Threats:
- 5.3.2.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.
- 5.3.2.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.
- 5.3.2.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.
- 5.3.2.6 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices in Atlantic White Cedar stands may destroy a unique wildlife wetland habitat that is difficult, and takes time, to restore.

5.3.3 Unintentional effects (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats:
- 5.3.3.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4 Unintentional effects (large scale) (Avg. Score: 1.00)

NJ Specific Threats:
- 5.3.4.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized) (Avg. Score: 1.00)

NJ Specific Threats:
- 6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.
- 6.1.1.3 Increased risk of harassment that results in a change in wildlife behavior and/or direct mortality from vehicle strikes.
- 6.1.1.4 Increased noise pollution.

6.1.4 Exploration of caves/mines (Avg. Score: 2.00)

NJ Specific Threats: 6.1.4.1 Poses significant threats to cave-hibernating bats as such activity forces bats to arouse from hibernation, depleting critical fat reserves needed to survive the winter.

6.1.4.2 Vandalism to mines and caves supporting colonies of wintering bats can lead to large-scale mortality during hibernation, and long-term habitat loss, reducing available hibernation sites, if damage goes unrepaired or uncontrolled.

6.1.4.3 Participants may introduce wildlife diseases when gear and apparel are not properly sanitized between sites.

6.1.7 Other (Avg. Score: 1.00)

NJ Specific Threats: 6.1.7.1 Use of recreational or commercial pyrotechnics may cause temporary disturbance to wildlife, in particular to nesting birds.

6.2 Military Exercises

6.2.1 Military exercises (Avg. Score: 1.00)

NJ Specific Threats: 6.2.1.1 Military testing and training exercises may inflict disturbance and potential physical harm to wildlife.

6.3 Work and Other Activities

6.3.1 Unauthorized research projects at significant habitats (Avg. Score: 1.00)

NJ Specific Threats: 6.3.1.1 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.1.3 Activities conducted without proper precautions may disturb and disrupt normal wildlife behaviors, which may impact reproductive success or survival, cause abandonment of critical sites, etc.

6.3.2 Authorized research projects at significant habitats (Avg. Score: 1.00)

NJ Specific Threats: 6.3.2.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.2.4 Activities conducted without proper precautions may disturb and disrupt normal wildlife behaviors, which may impact reproductive success or survival, cause abandonment of critical sites, etc.

6.3.3 Other "work" unrelated to research (Avg. Score: 1.00)

NJ Specific Threats: 6.3.3.1 Construction projects may disrupt normal wildlife behavior which can result in reduced reproductive success or survival, abandonment of critical sites, etc. (e.g., bridge-nesting birds).

6.3.3.4 Workers may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

7 Natural Systems Modifications

7.1 Fire and Fire Suppression

7.1.1 Increase in Fire Frequency/Intensity (Avg. Score: 1.00)

NJ Specific Threats: 7.1.1.1 Increase in frequency and intensity of wild fires as a result of droughts and heat waves drying out vegetation and litter.

7.1.1.2 Increase in frequency of wild fires as a result of illegal activities.

7.1.1.3 Unnatural fire regimes occurring as a result of military exercises.

7.1.1.4 Lack of diversity in age structure and composition of vegetation due to expansive, frequent fires.

7.1.2 Suppression of Fire Frequency/Intensity (Avg. Score: 1.00)

NJ Specific Threats: 7.1.2.1 Shift in vegetative communities as a result of suppression of natural fires.

7.1.2.2 Lack of diversity in age structure and composition of vegetation due to the suppression of fire.

7.2 Dams and Water Management/Use

7.2.5 Abstraction of Ground Water (domestic use) (Avg. Score: 1.00)

NJ Specific Threats: 7.2.5.1 Heavy withdrawal of ground water for domestic use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.6 Abstraction of Ground Water (commercial use) (Avg. Score: 1.00)

NJ Specific Threats: 7.2.6.1 Heavy withdrawal of ground water for industrial and commercial use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.7 Abstraction of Ground Water (agricultural use) (Avg. Score: 1.00)

NJ Specific Threats: 7.2.7.1 Heavy withdrawal of ground water for agricultural use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.10 Large Dams (Avg. Score: 1.67)

NJ Specific Threats: 7.2.10.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.11 Dams (size unknown) (Avg. Score: 1.00)

NJ Specific Threats: 7.2.11.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.13 Stream Burial (Avg. Score: 1.00)

NJ Specific Threats: 7.2.13.1 Eliminates riparian habitats.

7.2.13.2 Eliminates in-stream habitat and water resources for wildlife.

7.3 Other Ecosystem Modifications

7.3.4 Lack of natural disturbance patterns or ecosystem functions due to species loss (Avg. Score: 1.00)

NJ Specific Threats: 7.3.4.5 The lack of forest disturbance minimizes the diversity of herbaceous vegetation and other shrubs and trees that need a lot of sunlight to grow.

7.3.5 Poor habitat management (Avg. Score: 1.00)

NJ Specific Threats: 7.3.5.3 Vegetation clearing removes terrestrial and riparian corridors for animal movement, shelter, and resting areas.

7.3.5.6 Habitat management, including that which occurs on public and private lands, that does not consider timing and species' behaviors can result in the direct mortality and/or alteration or loss of habitat.

7.3.5.10 Ditching, draining and filling of marshes and wetlands eliminates habitat and degrades the remaining surrounding areas for wildlife.

7.3.5.12 Lack of diversity in age structure and composition of vegetation due to lack of natural disturbances and/or vegetation management.

7.3.5.14 Intentional felling and removal of dead standing trees or snags eliminates resting, nesting or feeding habitat, and precludes the snags eventual contribution to coarse woody debris and forest floor structure and habitat.

7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.5 Invasive non-native terrestrial/wetland plants (Avg. Score: 1.00)

NJ Specific Threats: 8.1.5.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.6 Invasive non-native fungal/bacterial diseases (Avg. Score: 3.00)

NJ Specific Threats: 8.1.6.1 The introduction of non-native fungal and bacterial diseases threatens native populations and ecosystems.

8.2 Problematic Native Species/Diseases

8.2.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.2.1.2 Invasive pathogens and insects may increase in range and abundance as limiting factors (such as temperature) are altered as a result of climate change.

8.5 Viral/Prion-induced Diseases

8.5.2 Named Species (Disease) (Avg. Score: 1.00)

NJ Specific Threats: 8.5.2.1 Diseases such as West Nile Virus, arenavirus, sudden oak death, Avian Influenza, and snake fungal disease cause morbidity or mortality to native populations.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.1 Domestic and Urban Waste Water

9.1.2 Run-off (Avg. Score: 1.00)

NJ Specific Threats: 9.1.2.2 Contaminants degrade aquatic and marine water quality and can bioaccumulate in benthic organisms, threatening wildlife by causing developmental and behavioral abnormalities and reproductive failure.

9.2 Industrial and Military Effluents

9.2.1 Oil Spills (Avg. Score: 1.00)

NJ Specific Threats: 9.2.1.1 Oil spills render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.1.2 Oil spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.1.3 Oil spills cause external oiling of wildlife and ingestion of oil, both of which can injure or kill wildlife.

9.2.2 Seepage from Mining (Avg. Score: 1.00)

NJ Specific Threats: 9.2.2.1 Contaminants from mining degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2.3 Other (Avg. Score: 1.00)

NJ Specific Threats: 9.2.3.1 Point and nonpoint source pollution such as polychlorinated biphenyls (PCBs), pesticides, heavy metals, and endocrine disrupting compounds (EDC's) into freshwater and marine systems pose threats to wildlife through direct contact and/or ingestion, and to aquatic species and their predators through bioaccumulation, impacting the reproductive success and neurological function of many avian and fish species.

9.2.3.2 Chemical spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.4 Other: Hydrofracturing (Avg. Score: 1.00)

NJ Specific Threats: 9.2.4.1 Contaminants from hydrofracturing degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2.4.2 Uncontrolled effluents escaping from hydrofracturing facilities can cause injury to wildlife and alter normal behaviors.

9.2.5 Other: Industrial toxic settling ponds (Avg. Score: 1.00)

NJ Specific Threats: 9.2.5.1 Surficial or open industrial effluent ponds can cause injury or death to wildlife that become exposed through ingestion or submersion.

9.3 Agricultural and Forestry Effluents

9.3.3 Herbicides and Pesticides (Avg. Score: 1.00)

NJ Specific Threats: 9.3.3.3 Use of pesticides can directly harm non-target species through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture (Avg. Score: 1.00)

NJ Specific Threats: 9.3.5.4 Improper use of current insecticides, such as those containing esfenvalerate, prallethrin, or piperonyl butoxide, or past use of pesticides containing chlordane still present in the soils, are toxic to various wildlife species, and can cause injury, mortality, or other effects that impair population viability.

9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.5 Air-Bourne Pollutants

9.5.6 Herbicides and Pesticides (Avg. Score: 1.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

9.6 Excess Energy

9.6.1 Light Pollution (Avg. Score: 1.00)

NJ Specific Threats: 9.6.1.1 Artificial lighting can reduce suitability of adjacent habitat for species sensitive to artificial lights by disorienting wildlife, reducing foraging suitability or success, or increasing visibility to predators, resulting in reduced diversity and/or productivity of species in adjacent habitat.

9.6.3 Noise Pollution (Avg. Score: 1.00)

NJ Specific Threats: 9.6.3.1 Acute and chronic noise pollution in and adjacent to terrestrial and aquatic (marine and freshwater) environments could disrupt normal behaviors of wildlife such as migration, communication, feeding, eluding predators, resting and breeding, etc.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 1.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.2 Droughts

11.2.1 Droughts (Avg. Score: 1.00)

NJ Specific Threats: 11.2.1.1 Contribute to hardened soils, decreasing water recharge during rains and increasing the likelihood of flash floods during storms.

11.2.1.2 Lead to lower groundwater levels and therefore, less available water for people and habitats.

11.3 Temperature Extremes

11.3.1 Temperature extremes (Avg. Score: 1.00)

NJ Specific Threats: 11.3.1.2 Increased temperatures can negatively impact wetland, riverine, lacustrine and vernal pool-associated or -dependent wildlife by reducing flows, increasing water temperatures, lowering water levels and causing premature drying of vernal habitats.

11.3.1.4 Extremely low temperatures and/or extensive periods of unseasonably low temperatures during critical life history stages (e.g., hibernation, gestation/nesting) can alter animals' behaviors and decrease survivorship.

11.4 Storms and Flooding

11.4.2 Increased rainfall (Avg. Score: 1.00)

NJ Specific Threats: 11.4.2.2 Extreme rain events can damage wildlife nesting and resting habitats, including impacts to avian eggs and chick and small mammal survivorship.

11.6 Phenology Shifting or Alteration

11.6.2 Phenology shifts related to predator-prey ecology (Avg. Score: 1.00)

NJ Specific Threats: 11.6.2.2 Shifts timing of species migration, breeding and hibernation, and available food resources, causes redistribution of species, or mortality for species that are unable to relocate due to their already isolated habitat or limited mobility.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 2.00)

NJ Specific Threats: 12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.2 Lack of up-to-date existing information (Avg. Score: 2.00)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.2.2 Lack of wildlife monitoring at sites with structures that pose high risk of mortality to SGCN wildlife.

12.1.3 Need to answer research question (Avg. Score: 3.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.3.2 There is an urgent need to answer questions about the future vulnerability or resiliency of NJ's cave-hibernating bats to White-nose Syndrome, and about the potential for an effective treatment to the disease.

12.1.4 Need to develop new technique (Avg. Score: 2.00)

NJ Specific Threats: 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.

12.1.4.2 Improve and evaluate survey methods for species not easily detected through standard survey methods.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 2.00)

NJ Specific Threats: 12.3.0.1 Regulatory habitat protections within state land use regulations are spatially limited to specific geographic areas (e.g., Pinelands, Coastal Area) or geographic features (e.g., wetlands, streams) and so fail to protect critical habitats that exist outside of these regulated areas.

12.3.0.3 Lack of a licensing program and standards for NJ Nuisance Wildlife Control Operators (NWCOs) leads to inadequate controls over handling of wildlife and lack of reporting of non-game/SGCN species (and all wildlife) encountered in nuisance situations.

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 1.00)

NJ Specific Threats: 12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 2.00)

NJ Specific Threats: 14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 1.00)

NJ Specific Threats: 14.2.1.1 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various forest management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 1.00)

NJ Specific Threats: 15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.4 Secure and promote the protection, restoration, and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts through incentive programs.

1.2.1.6 Secure and promote the protection/restoration of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.9 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing Forestry Stewardship Programs.

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.12 Create incentives (non-monetary and/or monetary) for land developers to redevelop abandoned areas (e.g., shopping centers, office complexes) to minimize the loss of natural habitats and reduce the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.14 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of herbicides and pesticides, and implementing more ecologically safe strategies when using such products.

1.2.1.19 Create incentives for federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to farmers, woodland landowners, and private landowners to adopt and/or endorse consistent BMPs concerning controlled burns to maintain and/or improve wildlife habitat.

1.2.1.20 Coordinate across government agencies and non-government organizations to create or expand upon tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMP's.

1.2.1.21 Create and/or support market-based programs that subsidize or create branding for products derived sustainably from managed wildlife habitats.

1.2.1.23 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to provide cost shares and/or plan approvals for management based on management approaches and prescriptions.

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

1.2.1.28 Create incentives to implement dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

2 Direct Management of Natural Resources

2.3 Fire management

2.3.3 Prescribed burning

2.3.3.1 Evaluate different management techniques of prescribed burns that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

2.3.3.2 Conduct prescribed burning in Northern New Jersey forests to maintain and regenerate a mosaic of upland forest habitats.

2.3.3.3 Conduct prescribed burning to improve wildlife habitat.

2.4 Fish and wildlife habitat structures

2.4.2 Hibernacula

2.4.2.1 Investigate the need to stabilize important bat hibernacula to ensure structural soundness and install the necessary supports.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.3 Restore and/or enhance habitats to benefit urban-associated SGCN.

2.10.0.4 Restore and/or enhance suitable travel corridors connecting conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.11 Restore and/or enhance critical migratory terrestrial and aquatic habitats (e.g., beach, grasslands, forest, scrub-shrub, etc.) for songbirds, raptors, shorebirds, waterfowl, bats and invertebrates through habitat restoration efforts and expand habitat restoration to adjacent private lands to increase the effective size of the habitat.

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.10.0.23 Restore and/or enhance roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

2.10.0.24 Use NJ's CHANJ mapping and guidance to establish vegetation and enhance or create corridors between fragmented habitats with similar vegetation, slope, soils, structure, etc. to ensure vegetative integrity is maintained to allow wildlife to safely disperse, and corridors are buffered with natural habitats to minimize disturbance to wildlife within the corridors.

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.13 Implement best management practices (BMPs), protective strategies, and guidelines for vegetation management to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.11.0.18 Implement forest management/silvicultural strategies that promote the development of new old-growth forests and/or minimize the loss of old-growth forest stands with large trees and within large, contiguous tracts.

2.11.0.19 Implement forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN.

2.11.0.21 Minimize the degradation, alteration and/or changes in hydrology of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and subsequent disturbances to and behavioral changes of wildlife by maintaining or enhancing these areas and biologically appropriate buffers through habitat management and/or revegetation or restoration efforts.

2.11.0.24 Conduct vegetation management adjacent to aquatic habitats following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.25 Conduct vegetation management along access roads following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.28 Conduct vegetation management in agricultural areas following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.29 Conduct vegetation management on transportation and service corridors (i.e., rights-of-way) following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.32 Increase structural habitat diversity around and when feasible, within agricultural landscapes by managing vegetation for a variety of species, in particular, those farms that have removed scrub-shrub habitat and/or fragmented forests, and by implementing ecologically best practices (e.g., no-till farming, maintaining hedgerows, buffer set-asides, etc.).

2.11.0.34 Increase structural habitat diversity by managing residential, commercial and recreational areas' landscapes for a variety of species. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.35 Increase structural habitat diversity by managing vegetation adjacent to aquatic habitats in a manner that provides a buffer from runoff and erosion and a microclimate to stabilize seasonal temperatures to benefit a variety of aquatic and semi-aquatic species.

2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.

2.11.0.38 Increase structural habitat diversity in and around horse/livestock farms by managing vegetation for a variety of species, in particular, in and around farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

2.11.0.40 Increase structural habitat diversity surrounding areas used for energy, mining, and transportation and service corridors by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides, and avoid managing habitat during the breeding seasons for ground-nesting birds, reptiles, amphibians and small mammals.

2.11.0.41 Increase structural habitat diversity through the implementation of a variety of vegetation management practices such a prescribed burns (either increasing or decreasing their frequency depending on the site and objective), plantings, etc. that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.43 Manage forests to increase variation in age structure and composition using BMPs that promote and maintain functioning ecological forest-based systems and biological diversity.

2.12 Water management

2.12.1 Ditch plugs

2.12.1.1 Implement best management practices (BMPs), protective strategies, and guidelines for ditch plugging to maintain and enhance healthy, resident and migratory SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.12.3 Drainage

2.12.3.4 Expand the acreages and enhance the effective size of SGCN habitats by reclaiming/restoring adjacent, degraded habitats by removing tile drains and drainage ditches.

2.12.3.9 Implement drain removal on state and other conservation lands to enhance food availability for migratory species (birds, bats, invertebrates).

2.12.3.10 Use tile drain and drainage ditch removal to create feeding and roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

2.12.3.11 Implement best management practices (BMPs), protective strategies, and guidelines when removing tile drains and drainage ditches to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.12.7 Waterfowl impoundment maintenance

2.12.7.3 Implement best management practices (BMPs), protective strategies, and guidelines for impoundment management to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.13 Wildlife damage management

2.13.0 Nuisance fish and wildlife damage

2.13.0.1 Investigate the impacts of mosquito control methods on predator SGCN (bats, insectivorous birds). Develop, implement and evaluate the effectiveness of mosquito control-BMPs designed to avoid depletion or contamination of SGCN's insect prey base and drinking sources with pyrethroids, organophosphates, or other chemicals.

2.14 Wildlife disease management

2.14.0 Wildlife disease strategy development and investigation

2.14.0.1 Investigate diseases/pathogens impacting SGCN and/or their habitats.

2.14.0.2 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

2.14.0.3 Protect SGCN from exotic pathogen introduction or incident through implementation of a "rapid response plan"; DFW to give priority attention to these species in planning and/or implementing a response.

2.14.0.4 Conduct long-term monitoring of diseases in vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts.

2.14.0.5 Assess the impacts of diseases on the life cycles of wildlife.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.6 Conduct long-term studies on resident and migratory SGCN to determine if there are changes to the populations' demography (productivity, survival, dispersal) and/or to their critical and/or supporting habitats (i.e., diminishing in value, acreage or connectivity, etc.), in particular changes that would not maintain SGCN at viable levels for species populations. Update data and GIS maps; provide updated information to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.11 Develop, implement and evaluate the effectiveness of town plans that avoid impacts to SGCN species and their habitats.

3.0.0.12 Compile available life history information on urban-associated SGCN (e.g., predators, levels of nest/young depredation, breeding longevity and reproductive effort over time, preferred nesting/reproductive requirements, fidelity to breeding and wintering sites, comprehensive assessment of migration routes and destinations) for future development of management strategies to benefit such species.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.24 Identify (through aerial and topographic maps), and confirm through field surveys, potential vernal pools using standard protocols. Provide confirmed vernal pool locations (and when possible, a description of the pools condition) and species' presence data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.26 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species including objectives and guidance pertaining to and the condition/status of critical and supporting habitats.

3.0.0.27 Evaluate the effectiveness of strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals through research and monitoring. Develop and provide NJ DEP and other appropriate governing agencies/commissions a summary of findings and recommendations to improve such efforts.

3.0.0.30 Conduct research to investigate the feasibility of managing and/or creating roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

3.0.0.31 Conduct short- and long-term studies (e.g., wildlife surveys and habitat assessments) to evaluate the effectiveness of vegetation management efforts to maintain, enhance and/or create roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.2 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.0.4 Conduct long-term monitoring of the impacts of contaminants to vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.2.0.7 Track (via a database that includes a GIS component) and research problematic species and diseases to determine their distribution, impacts on SGCN wildlife/wildlife communities, and develop potential control measures.

3.2.0.8 Implement and conduct long-term monitoring of control measures aimed at minimizing the impacts of problematic species and/or diseases to evaluate the effectiveness of such efforts and to identify and incorporate additional strategies as appropriate.

3.2.0.9 Maintain an inventory of invasive insect distribution and where they exist, conduct long-term monitoring of habitat conditions to assist in developing strategies to combat the impacts to SGCN habitats. Report potential infestations to NJ DEP.

3.2.0.10 Evaluate the effectiveness of sanitation/decontamination protocols in minimizing the transference of wildlife diseases and invasive plant species.

3.2.0.12 Investigate the impacts of ORV use and ORV-created noise on terrestrial and aquatic wildlife behavior and the impact of direct mortality from vehicle strikes. Integrate this information when mapping undeveloped roads and trails to identify potentially sensitive areas in northern NJ forests.

3.2.0.17 Conduct monitoring at constructed wind farms (within or outside of NJ) to assess the impacts on migratory species (birds, bats, insects) and determine if NJ's land use planning efforts and/or smart-growth plans need to be revised.

3.2.0.25 Conduct short- and long-term evaluations of structural stabilization strategies implemented at bat hibernacula and identify needed improvements to ensure structural soundness and of the potential impacts on bat hibernacula (i.e., the bats and internal conditions) when hibernacula are gated.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.2 Age, size and sex structure

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.3 Baseline inventory

3.2.3.8 Investigate the need to stabilize important bat hibernacula (e.g., structural soundness) and install the necessary supports.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.6 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) that could, through revegetation and/or enhancement efforts, become suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN.

3.3.1.14 Compile information (obtained through literature reviews, communication with other States along the Atlantic coast, academia, etc.) regarding the impacts of above water operation of wind turbines on migratory marine birds and bats. Provide data to appropriate governing agencies and/or State commissions for integration into permitting review processes.

3.3.1.18 Conduct an assessment using available data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.2 Monitoring

3.3.2.1 Evaluate the effectiveness of forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.9 Investigate the effectiveness of various silviculture techniques for enhancing forests for forest-dependent SGCN.

3.3.2.10 Evaluate the efficacy and success of different management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.7 Develop/improve forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

3.5.3.8 Develop best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5.3.9 Develop strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.14 Develop aquaculture practices in the coastal areas that are compatible with the recovery of SGCN.

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.3.16 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.3.20 Develop guidance on various silviculture techniques for enhancing forests for forest-dependent SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.3.26 Amend management strategies of gating bat hibernacula and/or installing additional supports for structural soundness based on the effectiveness and potential impacts on bat hibernacula (bats and internal conditions).

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.5 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

3.5.4.6 Investigate the feasibility of mitigating for the impacts of contaminants to vulnerable wildlife, particularly SGCN. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.5.4.13 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.17 Investigate new, non-invasive techniques for SGCN population evaluation through literature review, expert opinion, trial studies (if low risk), etc.

3.5.4.18 Investigate the effectiveness of survey techniques through selected “ground truthing” and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.20 Evaluate the effectiveness and potential impacts on bat hibernacula (bats and internal conditions) of gating bat hibernacula and/or installing additional supports for structural soundness. Amend management strategies as needed.

3.5.4.21 Develop BMPs to address problematic species and diseases of unknown origin.

3.5.4.22 Investigate the efficacy of implementing strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities.

4 Education

4.1 Educator/Instructor training

4.1.0 Public education

4.1.0.1 Provide educational resources and training programs to private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.1 Enhance and increase the effective size of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates by securing adjacent habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.3 Secure and protect riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.5 Secure and protect critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.6 Secure and protect old-growth forest stands with large trees and/or stands that are approaching or being actively managed for old growth forests, in particular those within large, contiguous forest tracts, through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.7 Secure and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.1 Promote the protection of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates and enhance these lands by increasing the effective size through conservation area designations of stopover habitats and adjacent private lands.

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.3 Increase the protection of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through conservation area designations.

6.3.0.5 Promote the protection of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through conservation area designations.

6.3.0.6 Promote the protection of old-growth forest stands with large trees and/or stands that are approaching or being actively managed for old growth forests, in particular those within large, contiguous forest tracts, through conservation area designations.

6.3.0.7 Promote the protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through conservation area designations.

7 Law Enforcement

7.1 Law enforcement

7.1.3 Sub-national Level

7.1.3.2 Increase the number of law enforcement officers tending to wildlife issues to a reasonable number to sufficiently cover the State and marine waters.

7.1.4 Scale Unspecified

7.1.4.1 Improve enforcement of policies and/or regulations that promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

7.1.4.3 Increase law enforcement presence proximate to sensitive areas [e.g., avian nesting sites, in particular rookeries, and reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively)] to deter human activity and subsequent disturbance to SGCN.

7.1.4.6 Recruit law enforcement to assist in the protection and enhancement of SGCN populations, in particular endangered species, through improved awareness of species through trainings, partnerships, and other methods. Information should include but is not limited to: 1) Issues concerning illegal collection of reptiles, 2) Persecution of rare snakes, 3) Illegal recreational activities on public lands (e.g., off-road vehicles) and their impact on wildlife, 4) Identification of sensitive areas, critical sites and/or "hot-spots" for collection.

7.1.4.7 Increase law enforcement presence to enforce regulations governing recreational activities (e.g., the use of personal watercraft and off road vehicles, caving, rock climbing, etc.) on conserved lands and within other sensitive habitats, and discourage activities that cause harm or disturbance to vegetation, wetlands, fish and wildlife.

7.1.4.8 Implement policies that protect critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates.

7.1.4.9 Implement policies that improve and secure habitat connections between conserved SGCN habitats.

7.1.4.10 Implement policies that promotes expanding acreages and enhances the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

7.1.4.11 Implement and enforce policies/regulations that will increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

7.1.4.13 Implement policies that protect vernal pool habitats to benefit SGCN that rely upon them and promotes connectivity of SGCN populations.

7.1.4.14 Implement policies that protect existing and developing old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

7.1.4.15 Implement policies that preserve and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

7.1.4.16 Implement policies that protect and restore riparian areas.

7.1.4.17 Improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.1.0.4 Engage government agencies, conservation partners and other stakeholders in constructive dialogues encouraging them to influence policy change and the creation of incentives through a habitat bill and/or municipal ordinances for backyard habitat.

8.1.0.13 Engage DOD in a constructive dialogue regarding strategies to minimize disturbances to all SGCN (i.e., beyond their federal requirements) from forest management and other practices on their lands.

8.1.0.14 Engage DOD in a constructive dialogue regarding strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities.

8.1.0.15 Engage government agencies, conservation partners and other stakeholders in discussions encouraging and supporting the creation of laws and policies requiring vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

8.1.0.16 Engage local governments in discussions regarding the importance of them adopting/passing ordinances which require assessing and addressing secondary impacts (i.e., ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

8.1.0.18 Engage NJDOT, NJ Transit Authority and other road management entities, wildlife conservation organizations/agencies (e.g., Division of Fish and Wildlife, New Jersey Conservation Foundation, Conserve Wildlife Foundation of NJ), and communities and citizens in discussions regarding the importance of and methods to enhance habitat connectivity, and work together to develop feasible strategies for ensuring that wildlife can disperse naturally and safely across roads and similar barriers to terrestrial and/or aquatic habitats.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.26 Coordinate across federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to woodland landowners to adopt or endorse consistent best management practices concerning controlled burns to maintain and/or improve forested habitat for wildlife.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.33 Engage government agencies, conservation partners and other land managers, communities, landowners, and commercial and industrial stakeholders in discussions regarding the importance of protecting and methods to protect priority wetlands beyond the levels afforded through regulation by maintaining and/or restoring optimal biological buffers around wetlands.

8.1.0.34 Work with the NJ Education Association and Department of Education to design curriculum and outdoor experimental learning opportunities, and provide training to teachers on implementation of these activities.

8.1.0.35 Promote backyard habitat management to create and/or enhance food availability for migratory species (birds, bats, invertebrates) on private lands.

8.1.0.37 Enlist landowners and NJ citizens in the protection of and survey efforts for SGCN, in particular rare species, by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management and wildlife-related volunteer programs.

8.1.0.38 Engage partners, stakeholders and land managers in constructive dialogue promoting forest stewardship for SGCN that use core forests and forested corridors.

8.1.0.40 Encourage researchers, land managers, naturalists and enthusiasts to follow proper procedures for the coordination and/or permitting of research/management activities involving wildlife and sensitive habitats, and discourage activities that alter vegetation or wetlands, or cause harm or disturbance to wildlife.

8.1.0.43 Engage Nuisance Wildlife Control Operators (NWCOs), conservation partners, and the public in conserving bat populations by advising proper exclusion methods from buildings, offering bat houses where roosting habitat is needed, and improving the public's understanding and acceptance of bats.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.1.0.48 Form cooperative partnerships with transportation and shipment agencies and companies to facilitate habitat creation and enhancement away from and outside of project areas and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.2 Recruitment and retention activities

8.2.3 For wildlife watching

8.2.3.1 Develop and implement nature-focused tourism opportunities including wildlife viewing sites, interpretive signage highlighting unique ecosystems/habitats, and wildlife-related recreational opportunities that do not negatively impact SGCN or their habitats.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.5 Develop and provide (or otherwise make publicly available) educational programs and/or materials that provide homeowners information on how to design dwellings and other structures in a manner that is wildlife friendly (e.g., using bird-safe glass on windows).

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.11 Develop and provide (or otherwise make publicly available) educational programs and/or materials to the public, wildlife-related professionals, foresters, etc., that describe the value of species that are often feared (e.g., snakes, bats, spiders, Allegheny woodrat) and/or deemed a "nuisance" (e.g., squirrel, deer, snapping turtle), and therefore, persecuted by people. Include information on tolerance, proper identification, eviction from human dwellings, how to minimize the animal's presence on the property, and/or how to live in harmony with the animal.

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.24 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

8.3.0.26 Develop educational outreach programs for private and public landowners and land managers regarding the importance of and how to manage core forests and forested corridors in a way that will be beneficial for SGCN, particularly endangered, threatened and special concern species.

8.3.0.27 Develop educational outreach programs for public and private landowners and land managers regarding the importance of structural habitat diversity, methods to increase diversity, and/or incentive programs available to increase habitat diversity.

8.3.0.29 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about the importance of maintaining a vegetative buffer along riparian and aquatic habitats to intercept storm water runoff and minimize soil erosion.

8.3.0.30 Develop educational outreach programs for private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.4 Develop a plan that directs the creation of new impoundments and/or the expansion of bogs for cranberry farming within or immediately adjacent to critical forested habitats in a manner that minimizes impacts on the natural hydrology of the watershed and subsequently, the natural wetlands in the area.

9.1.0.5 Develop a plan that directs the creation or expansion of energy or utility rights-of-way in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.6 Develop a plan that directs the creation or expansion of roads and railroads or the re-establishment of abandoned railroads within and adjacent to critical forested habitats in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.7 Develop a plan that directs the maintenance of or new channelization of forested streams and rivers in a manner that minimizes impacts of the aquatic ecological system and adjacent forest

9.1.0.9 Develop a plan that focuses on strategies to minimize the creation of renewable energy farms (e.g., solar, wind) and related infrastructures within and their impacts on forested habitats and the wildlife community.

9.1.0.10 Develop a plan that focuses on strategies to minimize the impacts of mining on critical forested habitats.

9.1.0.11 Develop a plan that focuses on strategies to minimize the impacts of power plants on critical forested habitats and the wildlife community.

9.1.0.13 Develop a plan to minimize agriculture that would result in groundwater withdrawal in critical forested areas.

9.1.0.14 Develop a plan to minimize development that would result in groundwater withdrawal in critical forested areas.

9.1.0.16 Develop a plan to minimize new lawnscapes and preserve natural vegetation within and adjacent to critical forest areas.

9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

9.1.0.20 Develop a plan to minimize the impacts of existing agricultural properties adjacent to and the conversion of forest habitats (terrestrial and aquatic, within or adjacent to critical forests) to agriculture, grazing areas/livestock farms, and plantations.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.24 Develop a plan to prevent livestock from entering water bodies in critical forested habitats.

9.1.0.25 Develop a plan to prevent the conversion of forested stream buffers to pastures in critical forested habitats.

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.31 Develop wetland restoration plans that consider the life history and needs of wildlife occupying targeted habitats.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.5 Develop response plans to address disease outbreaks within wildlife populations, in particular SGCN.

9.3.1.7 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.10 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.14 Create species management plans that will promote the protection and where appropriate, the development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

9.3.1.16 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.1.20 Use compiled life history information on urban-associated SGCN regarding threats, breeding, fecundity, survival, habitat needs, wintering sites/roosts, migration routes and destinations, etc. to develop wildlife management strategies to benefit such species.

9.3.2 Listed species recovery planning

9.3.2.1 Develop proactive species recovery plans for all endangered and threatened species including guidance and objectives pertaining to critical and supporting habitat to meet and maintain recovery goals.

9.3.3 Habitat management planning

9.3.3.5 Develop a management plan using forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

9.3.3.6 Develop a management plan for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

9.3.3.8 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.3.9 Develop a response plan to outbreaks using BMPs to control infestations and limit their spread in a way that avoids excessive harm to non-target species.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.16 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.21 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.3.23 Create forest management plans that will promote the protection and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

9.3.3.24 Develop a plan to improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

9.3.3.32 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

9.3.3.38 Use compiled life history information on urban-associated SGCN regarding threats, breeding, fecundity, survival, habitat needs, wintering sites/roosts, migration routes and destinations, etc. to develop habitat management strategies to benefit such species.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.3 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.10 Use CHANJ mapping in reviews of proposed energy, mining, transportation and utility service companies/agencies' projects to attempt to maintain habitat connectivity and reduce fragmentation, and identify potential impacts of the projects.

11.1.1.11 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed offshore energy projects relating to drilling, extraction and distribution of petroleum and gas products to reduce habitat destruction and minimize impacts on wildlife.

11.1.1.12 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed solar farm projects to reduce habitat fragmentation and minimize impacts on wildlife.

11.1.1.13 Use the best available science (species data, habitat present, wind farm layout options, wind blade impacts on migratory species, location of migration routes, etc.) when conducting regulatory reviews of proposed wind farm projects to minimize impacts on migratory and resident wildlife and reduce habitat fragmentation.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.2.2 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.7 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on the importance of maintaining habitat connectivity, minimizing fragmentation, and the use of CHANJ products to help them target areas for such planning.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.13 Provide educational resources and technical support to public landowners, private landowners with sufficient acreage, and land managers to promote the protection and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

11.2.0.14 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters), and to enhance or restore biologically appropriate buffers.

11.2.0.15 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and landowners about the importance of retaining and in an effort to protect, create, enhance and/or restore vegetation along aquatic habitats.

11.2.0.16 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

11.2.0.17 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of vernal pools and the protection, enhancement and/or restoration of biologically appropriate buffers.

11.2.0.20 Provide educational resources and technical support to public and private landowners and land managers to promote the protection and/or enhancement of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN.

11.2.0.21 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates to promote the protection and/or enhancement of those adjacent habitats to increase the effective size of the migratory habitat.

11.2.0.22 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

11.2.0.23 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to SGCN habitats to promote the protection and/or enhancement of those adjacent habitats to increase the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and that connect conserved SGCN habitats.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.0.28 Provide educational resources, training programs, and on-the-ground guidance to Nuisance Wildlife Control Operators (NWCOs) and the public to ensure that proper bat exclusion methods are followed when addressing issues of bats in buildings.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.1 Engage partners and stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.3 Provide educational resources, training programs, and on-the-ground guidance to DOD to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop and implement forest management and other practices that minimize disturbances to SGCN (i.e., beyond their federal requirements).

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

100 Law and Policy

100. Legislation

100.1.3 Sub-national Level

100.1.3.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.3.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.4 County and Local

100.1.4.1 Enhance critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates through the local ordinances of adjacent private lands to increase the effective size of the habitat.

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.3 Expand the acreages and enhance the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN through local ordinances.

100.1.4.4 Secure wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and biologically appropriate buffers through local ordinances.

100.1.4.5 Secure SGCN-inhabited/used freshwater wetlands and biologically appropriate buffers through local ordinances.

100.1.4.7 Secure vernal pools and biologically appropriate buffers through local ordinances.

100.1.4.8 Secure critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through local ordinances.

100.1.4.9 Secure existing and developing old-growth forest stands with large trees, in particular those within large, contiguous forest tracts, through local ordinances.

100.1.4.10 Secure critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through local ordinances.

100.1.4.11 Secure riparian areas through local ordinances.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.5.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.1 Develop (and/or improve) policies and/or regulations that will promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

100.3.0.3 Develop policies that will promote the long term protection of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates.

100.3.0.5 Develop policies that will promote improved and secure habitat connections between conserved SGCN habitats.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.7 Amend current policies and/or regulations to increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.10 Develop policies that promote protecting vernal pool habitats to benefit SGCN that rely upon them and promotes connectivity of SGCN populations.

100.3.0.11 Develop policies that will ensure the protection and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

100.3.0.12 Develop policies that promote the preservation and protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.13 Develop policies that will promote protecting and restoring riparian areas.

100.3.0.14 Develop policies and/or regulations that increase the protective buffers of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) to biologically appropriate distances to benefit SGCN that rely upon these habitats and improve the function of the [associated] aquatic systems.

100.3.0.23 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.31 Create or expand tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMPs.

100.3.0.32 Coordinate regulations across agencies to maximize availability of and enrollment in existing Forestry Stewardship Programs (e.g., "Woodland Stewards", Farm Bill, partners, etc.) to maintain and/or improve forest habitat.

100.3.0.40 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.3.0.42 Fully adopt the former Storm water Management Rules' 300ft buffer requirements into the Flood Hazard Area Control Act Rules.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.48 Propose new State law or regulation mandating that a State-level "development impact fee" be assessed on all new development approved by municipalities (via the Municipal Land Use Law processes), and dedicate such monies to the development and implementation of regional Habitat Conservation Plans (or existing plans/programs serving the same regional function).

100.3.0.49 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address the issue of disturbance to habitat or species as a result of human activities (e.g., construction, bridge maintenance, road work, etc.).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.53 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded rights-of-way corridors associated with energy transport/transmission.

100.3.0.54 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded surface mining areas.

100.3.0.56 Develop regulations that when implemented will protect critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates.

100.3.0.57 Develop regulations that when implemented will improve and secure habitat connections between conserved SGCN habitats.

100.3.0.58 Develop regulations that when implemented will promote the expansion of acreages and enhancement of the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.59 Develop regulations that when implemented will increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

100.3.0.61 Develop regulations that when implemented will protect vernal pool habitats to benefit SGCN that rely upon them and promotes connectivity of SGCN populations.

100.3.0.62 Develop regulations that when implemented will protect existing old-growth forest stands with large trees and/or stands that are being actively managed for old growth forests, in particular those within large, contiguous forest tracts.

100.3.0.63 Develop regulations that when implemented will preserve and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.64 Develop regulations that when implemented will protect and restore riparian areas.

100.3.0.71 Develop regulations for licensing, permitting, or certification of Nuisance Wildlife Control Operators (NWCOs) that handle removal/exclusion of protected wildlife, such as bats and snakes, to ensure that proper methods are followed and that occurrences are reported.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.3 Develop policies for mandatory buffer strips on preserved farmlands and state-owned agricultural lands.

100.4.0.4 Create a policy that requires the use of wildlife habitat and corridor mapping products for both regulatory use when conducting project reviews and planning/siting new or expanded rights-of-way projects.

100.4.0.8 Develop a white paper addressing the impacts that existing, new or expanded rights-of-way have upon wildlife, wildlife habitats and habitat connectivity.

100.4.0.12 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.4.0.13 Develop policies for different circumstances (e.g., roadsides and medians, riparian, aquatic and terrestrial habitats) that outline appropriate habitat/vegetation management strategies and schedules to minimize risks to and benefit wildlife.

100.4.0.16 Develop policies to implement habitat management strategies that will increase the structural diversity surrounding areas used for energy, mining, and transportation and service corridors which include but are not limited to the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-

100.4.0.17 Develop policies to implement habitat management strategies, including prescribed burns, that will increase the structural diversity on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies to control and reduce the impacts of invasive, non-native species in order to increase structural habitat diversity.

100.4.0.18 Develop policies to minimize the extent of infrastructure associated with energy and service corridors or areas (e.g., wind and solar farms, pipelines, utility lines) and that require the implementation of habitat management strategies that will increase the structural diversity in the area including (e.g., the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides).

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

North Atlantic Right Whale

Focal species that comprise this Conservation Target:

North Atlantic Right Whale

Threats and Action Drivers associated with this Conservation Target:

2 Agriculture and Aquaculture

2.4 Marine and Freshwater Aquaculture

2.4.1 Subsistence/Artisinal Aquaculture (Avg. Score: 1.00)

NJ Specific Threats:
- 2.4.1.2 Increased risk of parasite introduction into marine environments.
- 2.4.1.3 Potential for increased nutrient and effluent loads.

2.4.2 Industrial Aquaculture (Avg. Score: 1.00)

NJ Specific Threats:
- 2.4.2.2 Increased risk of parasite introduction into marine environments.
- 2.4.2.3 Potential for increased nutrient and effluent loads.

3 Energy Production and Mining

3.1 Oil and Gas Facilities and Pipelines

3.1.1 Distribution processes of petroleum and other liquid hydrocarbons (Avg. Score: 3.00)

NJ Specific Threats:
- 3.1.1.2 Loss, alteration and/or degradation of habitat.
- 3.1.1.3 Increased risk of oil spills.
- 3.1.1.4 Increased noise pollution.
- 3.1.1.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.
- 3.1.1.6 Increased risk of collision between marine mammals, sea turtles and fish and the marine-based structures/facilities.

3.1.2 Natural gas distribution processes (Avg. Score: 3.00)

NJ Specific Threats:
- 3.1.2.2 Loss, alteration and/or degradation of habitat.
- 3.1.2.3 Increased risk of gas leaks and explosions.
- 3.1.2.4 Increased noise pollution.
- 3.1.2.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.
- 3.1.2.6 Increased risk of collision between marine mammals, sea turtles and fish and the marine-based structures/facilities.

3.2 Mining and Quarrying

3.2.4 Sand Dredging (outside shipping lanes) (Avg. Score: 2.00)

NJ Specific Threats:
- 3.2.4.1 Loss, alteration and/or degradation of benthic marine habitats.
- 3.2.4.2 Increased noise pollution.
- 3.2.4.3 Potential for direct mortality of benthic organisms.

3.3 Renewable Energy

3.3.1 Wind Power (Avg. Score: 2.00)

NJ Specific Threats: 3.3.1.1 Turbines, blades, and structure foundations create a collision risk to volant species (birds, bats and invertebrates) and marine animals.

3.3.1.3 Loss, alteration and/or degradation of habitat.

3.3.1.4 Increased commercial infrastructure.

3.4 Conventional Power Plants

3.4.0 Conventional Power Plants (Avg. Score: 1.00)

NJ Specific Threats: 3.4.0.3 Alteration of the temperature, pH and/or hydrology of aquatic ecosystems change plant communities and can harm wildlife and/or impact their behavior and survivorship.

4 Transportation and Service Corridors

4.3 Shipping Lanes

4.3.1 Movement of large ships in shipping lanes (Avg. Score: 3.00)

NJ Specific Threats: 4.3.1.1 Increased ship traffic increases the risk of wildlife mortality from strikes.

4.3.1.2 May disturb nesting and foraging of shoreline birds and aquatic animals, and/or alter migratory patterns of aquatic and marine wildlife.

4.4 Flight Paths

4.4.1 Airplane flight paths (Avg. Score: 1.00)

NJ Specific Threats: 4.4.1.1 Increased noise disturbance to wildlife, disrupting their normal behaviors.

5 Biological Resource Use

5.4 Fishing and Harvesting of Aquatic Resources

5.4.3 Unintentional effects (subsistence/small scale) (Avg. Score: 3.00)

NJ Specific Threats: 5.4.3.1 Abandoned fishing tackle and gear, crab pots without excluders and ghost crab pots increase the risk of injury and death to marine mammals, sea turtles, sea birds, pinnipeds and fish species as well as terrestrial and semi-aquatic species as a result of consuming tackle or gear, entrapment and entanglement in gear.

5.4.3.2 Commercial/recreational shellfish dredging may impact marine ecosystems by uprooting submerged aquatic vegetation, disrupting substrates, increasing turbidity, and increasing predator species in localized areas.

5.4.3.5 Trawling disrupts habitat and threatens marine species including benthic/bottom feeding fishes, invertebrates and other benthic organisms as it disrupts and homogenizes the substratum, can lead to species decline and reduced species diversity.

5.4.3.6 Fishing gear used by commercial fisheries results in bycatch or entanglement of non-targeted wildlife leading to injury and/or mortality.

5.4.3.7 Improperly sanitized equipment, relocation of fish, importation and release of non-native species, and the use of bait from a different location can spread invasive species and diseases from one waterbody to another.

5.4.3.8 Lead in fishing tackle is consumed by wildlife in the course of foraging and scavenging, causing injury and death.

5.4.4 Unintentional effects (large scale) (Avg. Score: 3.00)

NJ Specific Threats: 5.4.4.2 Commercial/recreational shellfish dredging may impact marine ecosystems by uprooting submerged aquatic vegetation, disrupting substrates, increasing turbidity, and increasing predator species in localized areas.

5.4.4.4 Trawling disrupts habitat and threatens marine species including benthic/bottom feeding fishes, invertebrates and other benthic organisms as it disrupts and homogenizes the substratum, can lead to species decline and reduced species diversity.

5.4.4.5 Fishing gear used by commercial fisheries results in bycatch or entanglement of non-targeted wildlife leading to injury and/or mortality.

5.4.4.6 Overexploitation of riparian, estuarine, and marine fisheries may deplete food resources required by marine mammals, sea turtles, marine fish and piscivorous birds, in turn resulting lower reproduction and survival.

5.4.4.7 Improperly sanitized equipment, relocation of fish, use of bait from a different location, can spread invasive species and diseases from one waterbody to another.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.2 Boating (Avg. Score: 1.00)

NJ Specific Threats:

6.1.2.1 Alteration and/or degradation of aquatic habitat.

6.1.2.2 Increased disturbance to marine animals and ocean-, bay- and marsh-associated birds which can alter their behavior decreasing the likelihood of their success and/or reproduction.

6.1.2.3 Motorized boat propellers can inflict physical harm aquatic wildlife species.

6.1.2.4 A lack of law enforcement staff limits NJ's ability to enforce the Marine Mammal Protection Act which restricts approach distances to marine mammals.

6.1.5 Wildlife observation and photography (Avg. Score: 1.00)

NJ Specific Threats:

6.1.5.1 Improperly conducted recreational activities may disrupt normal wildlife behaviors which can result in reduced reproductive success or survival, abandonment of critical sites, etc.

6.1.7 Other (Avg. Score: 1.00)

NJ Specific Threats:

6.1.7.1 Use of recreational or commercial pyrotechnics may cause temporary disturbance to wildlife, in particular to nesting birds.

6.1.7.3 Drone use in areas with sensitive wildlife (e.g., nesting and foraging birds, migrating and foraging/feeding whales) can alter their behavior and can cause disturbance that impacts their reproductive and/or foraging success.

6.2 Military Exercises

6.2.1 Military exercises (Avg. Score: 3.00)

NJ Specific Threats:

6.2.1.1 Military testing and training exercises may inflict disturbance and potential physical harm to wildlife.

6.2.1.2 Low to mid-frequency active sonar threaten marine mammals by disrupting navigation, foraging and communications ability, and activities may disrupt normal behaviors of nesting birds and other wildlife.

6.3 Work and Other Activities

6.3.2 Authorized research projects at significant habitats (Avg. Score: 3.00)

NJ Specific Threats:

6.3.2.1 Seismic air guns used during scientific marine research threatens spawning, feeding and breeding marine fishes in essential fish habitat areas off the NJ coast and may cause disturbance and physical harm to whales, dolphins, pinnipeds and sea turtles. Seismic surveys may also disturb marine mammals by disrupting navigation, foraging and communications ability.

7 Natural Systems Modifications

7.3 Other Ecosystem Modifications

7.3.1 Shoreline Stabilization (Avg. Score: 1.00)

NJ Specific Threats: 7.3.1.3 Efforts to stabilize barrier islands and shorelines, including jetties, groins, and bulkheads, degrade foraging areas for migrating whales and sea turtles.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.1.1.5 Invasive, non-native animals and plants increase the risk of introduction and transference of diseases

8.1.2 Invasive non-native aquatic animals (Avg. Score: 1.00)

NJ Specific Threats: 8.1.2.1 Parasites introduced into the marine environment can alter the reproductive and feeding behavior of native wildlife, leading to their decline.

8.1.3 Invasive non-native aquatic plants (Avg. Score: 1.00)

NJ Specific Threats: 8.1.3.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.6 Invasive non-native fungal/bacterial diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.1.6.1 The introduction of non-native fungal and bacterial diseases threatens native populations and ecosystems.

8.2 Problematic Native Species/Diseases

8.2.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.2.1.2 Invasive pathogens and insects may increase in range and abundance as limiting factors (such as temperature) are altered as a result of climate change.

8.4 Problematic Species/Diseases of Unknown Origin

8.4.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.4.1.1 Non-native or poorly understood diseases and parasites could potentially impact native animals.

8.5 Viral/Prion-induced Diseases

8.5.1 Unspecified Species (Disease) (Avg. Score: 1.00)

NJ Specific Threats: 8.5.1.1 There is a large knowledge gap regarding the existence of, or potential for, other diseases impacting native wildlife.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.1 Domestic and Urban Waste Water

9.1.1 Sewage (Avg. Score: 2.00)

NJ Specific Threats: 9.1.1.1 Degradation of aquatic and marine water quality and habitats by changing turbidity, flow and water chemistry.

9.1.1.2 Leads to increased eutrophication and algae blooms that result in oxygen depletion.

9.1.1.3 Contaminants in sewage treatment effluents and Combined Sewer Overflows can cause developmental and behavioral abnormalities and reproductive failure in wildlife.

9.1.2 Run-off (Avg. Score: 2.00)

NJ Specific Threats: 9.1.2.1 Chemical fertilizers and nutrient run-off changes the pH in streams and ponds and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.1.2.2 Contaminants degrade aquatic and marine water quality and can bioaccumulate in benthic organisms, threatening wildlife by causing developmental and behavioral abnormalities and reproductive failure.

9.2 Industrial and Military Effluents

9.2.1 Oil Spills (Avg. Score: 3.00)

NJ Specific Threats: 9.2.1.1 Oil spills render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.1.2 Oil spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.1.3 Oil spills cause external oiling of wildlife and ingestion of oil, both of which can injure or kill wildlife.

9.2.3 Other (Avg. Score: 3.00)

NJ Specific Threats: 9.2.3.1 Point and nonpoint source pollution such as polychlorinated biphenyls (PCBs), pesticides, heavy metals, and endocrine disrupting compounds (EDC's) into freshwater and marine systems pose threats to wildlife through direct contact and/or ingestion, and to aquatic species and their predators through bioaccumulation, impacting the reproductive success and neurological function of many avian and fish species.

9.2.3.2 Chemical spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.3.3 Chemical spills may render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.3 Agricultural and Forestry Effluents

9.3.3 Herbicides and Pesticides (Avg. Score: 1.00)

NJ Specific Threats: 9.3.3.1 Pesticides degrade terrestrial and aquatic habitats, especially streams, ponds and wetlands. Aquatic wildlife are particularly sensitive to these contaminants, which can cause developmental and behavioral abnormalities and reproductive failure. Some contaminants may bioaccumulate in predatory fish and birds and disrupt reproduction.

9.4 Garbage and Solid Waste

9.4.1 Direct hazards to wildlife (Avg. Score: 3.00)

NJ Specific Threats: 9.4.1.1 Wildlife may ingest garbage causing choking or impingement in the digestive system, or they may become physically entangled in it (e.g., plastic or abandoned fish nets); conditions that make them unable to feed or drink, cause them to suffocate or drown, or otherwise restrict the animal's movement making them more susceptible to predators, starvation or injury.

9.5 Air-Bourne Pollutants

9.5.1 Acid Rain (Avg. Score: 2.00)

NJ Specific Threats: 9.5.1.1 Causes acidification of water bodies, resulting in changes to aquatic and marine communities and reducing biodiversity, and creating conditions that are unsuitable for some aquatic (freshwater and marine) and semi-aquatic species that are sensitive to pH shifts.

9.5.6 Herbicides and Pesticides (Avg. Score: 1.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

9.6 Excess Energy

9.6.1 Light Pollution (Avg. Score: 1.00)

NJ Specific Threats: 9.6.1.1 Artificial lighting can reduce suitability of adjacent habitat for species sensitive to artificial lights by disorienting wildlife, reducing foraging suitability or success, or increasing visibility to predators, resulting in reduced diversity and/or productivity of species in adjacent habitat.

9.6.3 Noise Pollution (Avg. Score: 3.00)

NJ Specific Threats: 9.6.3.1 Acute and chronic noise pollution in and adjacent to terrestrial and aquatic (marine and freshwater) environments could disrupt normal behaviors of wildlife such as migration, communication, feeding, eluding predators, resting and breeding, etc.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 1.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.3 Temperature Extremes

11.3.1 Temperature extremes (Avg. Score: 2.00)

NJ Specific Threats: 11.3.1.3 Temperature extremes of surface water and air degrades marine habitats and ecosystems, threatening marine wildlife. Such extremes also disrupt offshore currents and migratory patterns, species' ranges, and/or impact communities/food chains, all of which further impact the ecosystem.

11.3.1.4 Extremely low temperatures and/or extensive periods of unseasonably low temperatures during critical life history stages (e.g., hibernation, gestation/nesting) can alter animals' behaviors and decrease survivorship.

11.4 Storms and Flooding

11.4.1 Storms and flooding (Avg. Score: 1.00)

NJ Specific Threats: 11.4.1.1 Extreme storms and flooding events threaten aquatic and marine wildlife through habitat degradation and alteration, including alterations to off-shore or back-bay benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic and marine wildlife.

11.6 Phenology Shifting or Alteration

11.6.2 Phenology shifts related to predator-prey ecology (Avg. Score: 1.00)

NJ Specific Threats: 11.6.2.2 Shifts timing of species migration, breeding and hibernation, and available food resources, causes redistribution of species, or mortality for species that are unable to relocate due to their already isolated habitat or limited mobility.

11.6.3 Phenology shifts related to species redistribution (Avg. Score: 1.00)

NJ Specific Threats: 11.6.3.1 Shifts in timing of species migration, breeding and hibernation, and available food resources, as a result of wildlife range shifts driven by climate change.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 2.00)

NJ Specific Threats: 12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.1.6 Lack of information regarding migratory pathways and response of wildlife to lights and noise associated with offshore wind turbines.

12.1.2 Lack of up-to-date existing information (Avg. Score: 2.00)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.3 Need to answer research question (Avg. Score: 1.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.4 Need to develop new technique (Avg. Score: 1.00)

NJ Specific Threats: 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 1.00)

NJ Specific Threats: 12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 2.00)

NJ Specific Threats: 14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 1.00)

NJ Specific Threats: 14.2.1.2 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various aquatic and riparian management practices.

14.2.1.3 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various coastal management practices.

14.2.1.4 Need to develop greater understanding of and support for efforts implemented to maintain disturbance-free habitats that allow coastal wildlife populations to thrive alongside human residential and recreational uses.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 2.00)

NJ Specific Threats: 15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.27 Create legislation to re-instate incentives for citizens bringing their own shopping bag(s) to grocery stores in an effort to decrease the amount of plastic shopping bags in circulation.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.23 Identify (through wildlife and aquatic system surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and research water quality parameters for all [types of] aquatic systems for various SGCN populations.

3.0.0.25 Identify pathways of migratory SGCN in the Atlantic Coastal and Marine Regions (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and use the data to help evaluate the potential short- and long-term impacts of wind turbines, radio towers, utility guy lines, and other tall coastal structures on migratory populations.

3.0.0.27 Evaluate the effectiveness of strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals through research and monitoring. Develop and provide NJ DEP and other appropriate governing agencies/commissions a summary of findings and recommendations to improve such efforts.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.2 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.0.16 Conduct long-term monitoring to evaluate the success of marine conservation zone designations on marine SGCN.

3.2.0.17 Conduct monitoring at constructed wind farms (within or outside of NJ) to assess the impacts on migratory species (birds, bats, insects) and determine if NJ's land use planning efforts and/or smart-growth plans need to be revised.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.3 Baseline inventory

3.2.3.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) suitable areas for marine conservation zone designation and promote policies and regulations that support the designation of such areas.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.15 Conduct a literature review to determine the potential impacts of underwater vibrational noise on marine mammals, sea turtles and fishes emanating from offshore wind turbines during routine operations.

3.3.1.16 Gather "best information" for spatial modeling and update/create a current model/depiction of anticipated habitat shifts from sea-level rise, flooding, etc.

3.3.1.27 Develop a matrix that lists every commercial and recreational fishery and aquaculture facility that operates in state waters and for each fishery listed, provide details regarding their fishing seasons, gear descriptions, locations and number of fishers. Add a GIS component to overlay species of concern and sensitive areas.

3.3.2 Monitoring

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.5 Conduct long-term monitoring of water quality of SGCN aquatic habitats (and aquatic systems feeding into those habitats) to evaluate protection and management efforts to reduce, if not eliminate, chemical contamination, siltation, eutrophication, and other forms of pollution/contamination of aquatic systems.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.8 Develop best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.14 Develop aquaculture practices in the coastal areas that are compatible with the recovery of SGCN.

3.5.3.16 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.3.27 Conduct an assessment and develop a location list of available equipment for boom deployment during oil spills.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.13 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

3.5.4.22 Investigate the efficacy of implementing strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities.

4 Education

4.1 Educator/Instructor training

4.1.1 Aquatic resource education

4.1.1.1 Provide educational resources and training programs to teachers in aquatic resource education that includes information regarding climate change and sea-level rise for incorporation into the class curriculum and/or as the focus of school field trips.

4.1.1.2 Provide educational resources and training programs to teachers in aquatic resource education that includes information regarding how coastal stabilization negatively impacts wildlife by preventing natural processes for incorporation into the class curriculum and/or as the focus of school field trips.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.5 Secure and protect critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.5 Promote the protection of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through conservation area designations.

6.3.0.9 Promote the protection of critical marine habitats for SGCN through conservation area designations.

7 Law Enforcement

7.1 Law enforcement

7.1.3 Sub-national Level

7.1.3.1 Enforce slow wake zones and marine conservation area regulations to protect aquatic vegetation.

7.1.3.2 Increase the number of law enforcement officers tending to wildlife issues to a reasonable number to sufficiently cover the State and marine waters.

7.1.4 Scale Unspecified

7.1.4.1 Improve enforcement of policies and/or regulations that promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

7.1.4.4 Improve enforcement of policies/regulations aimed at protecting and preserving critical coastal and marsh habitats, and secure mitigation for losses that create an environmental benefit.

7.1.4.5 Enforce current policies and/or regulations to increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal SGCN, and implement and enforce amended policies/regulations.

7.1.4.7 Increase law enforcement presence to enforce regulations governing recreational activities (e.g., the use of personal watercraft and off road vehicles, caving, rock climbing, etc.) on conserved lands and within other sensitive habitats, and discourage activities that cause harm or disturbance to vegetation, wetlands, fish and wildlife.

7.1.4.11 Implement and enforce policies/regulations that will increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.2 Develop a team of personnel from government entities, conservation organizations and other stakeholders engaged in oil/gas spill response for marine and freshwater habitats to develop a feasible plan for oil spill response and/or to amend NJ's current oil spill response plan that clearly outlines each organizations responsibilities and an assessment and location list of available equipment for boom deployment during oil spills.

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.1.0.6 Engage government agencies, conservation partners and other stakeholders in discussions focused on sharing information regarding coastal and marine critical wildlife habitats, developing comprehensive mapping to assist in reducing impacts of energy production activities, and establishing a long-term monitoring program to update the data. Ensure this information is available to appropriate personnel for planning or response measures.

8.1.0.11 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting sportsmen's organizations and fisheries, as well as public constituents, addressing the unintended effects abandoned fishing gear, tackle and crab pots can have on wildlife, and promote the collection and/or reporting of abandoned items and their locations.

8.1.0.12 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting sportsmen's organizations and fisheries, as well as public constituents, addressing the unintended effects fishing gear and tackle can have on wildlife.

8.1.0.14 Engage DOD in a constructive dialogue regarding strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.23 Work with the NJ Division of Fish and Wildlife's Bureau of Marine Fisheries, local recreational and commercial fisheries associations, and fishers to develop a process that encourages fishermen to report the number and location of lost pots to the appropriate state agency/agencies at the end of the harvest season.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.31 Encourage government agencies, conservation partners and other stakeholders to work together to create GIS mapping for marine wildlife and habitat to assist in reducing impacts of energy production activities. Ensure this information is available to appropriate personnel for planning or response measures.

8.1.0.40 Encourage researchers, land managers, naturalists and enthusiasts to follow proper procedures for the coordination and/or permitting of research/management activities involving wildlife and sensitive habitats, and discourage activities that alter vegetation or wetlands, or cause harm or disturbance to wildlife.

8.1.0.42 Engage citizens, wildlife observers and photographers through discussions and distributable information regarding the importance of and encouraging implementing responsible and ethical behavior when observing wildlife by developing an alliance of wildlife photographers and widely circulating recommendations on how to reduce impact.

8.1.0.46 Form cooperative partnerships with dredging companies to facilitate habitat creation and enhancement within project areas, and to identify seasonal timing of activities that would minimize impacts to wildlife and their habitats.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.1.0.48 Form cooperative partnerships with transportation and shipment agencies and companies to facilitate habitat creation and enhancement away from and outside of project areas and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.2 Utilize WSFR grant funds, in combination with alternate funding sources as needed, to implement an extensive educational/outreach program consisting of displays, fliers, list-serve mailings, Facebook posts and speaking engagements with sportsmen's organizations and fisheries, as well as public constituents, addressing the unintended effects fishing gear and tackle can have on non-target species.

8.3.0.4 Utilize WSFR grant funds, in combination with alternate funding sources as needed, to implement an extensive educational/outreach program consisting of displays, fliers, list-serve mailings, Facebook posts and speaking engagements with sportsmen's organizations and fisheries addressing the unintended effects abandoned fishing gear, tackle and crab pots can have on wildlife.

8.3.0.8 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate recreationists and encourage landowners to eliminate garbage in the vicinity of suitable wildlife habitat, in particular SGCN habitat. Information should include the detrimental impacts garbage may have on various wildlife species.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.14 Develop an educational outreach program using a variety of media to ensure maximizing the distribution of information, in particular targeting sportsmen's organizations and fisheries, regarding the unintended effects abandoned fishing gear, tackle and crab pots can have on wildlife, including non-target species.

8.3.0.15 Develop an educational outreach program for citizens regarding: 1) The impacts to wildlife as a result of plastic bags entering aquatic and marine systems, 2) The importance of decreasing the amount of plastic shopping bags in circulation, 3) The need for businesses to voluntarily charge for bags or reimburse people for using their own non-plastic bags, and 4) The need for their assistance through public pressure on legislators and government to pass legislation that that limits the amount of plastic shopping bags in circulation.

8.3.0.20 Develop an educational outreach program for landowners, particularly those in the coastal and bay areas, boaters, and the general public with information about the negative impacts on marine wildlife and habitats, and steps they can implement to reduce these impacts.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.8 Develop a plan that focuses on strategies for oil pipelines to avoid sensitive habitats that would be highly impacted by oil spills.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.6 Amend NJ's current oil spill response plan to 1) expand the geographic area addressed, 2) expand the targeted species impacted and in need of recovery, and 3) revise current and integrate new actions into the plan as needed.

9.3.1.15 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.1.16 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.2 Listed species recovery planning

9.3.2.1 Develop proactive species recovery plans for all endangered and threatened species including guidance and objectives pertaining to critical and supporting habitat to meet and maintain recovery goals.

9.3.3 Habitat management planning

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.12 Develop a management plan using engineering standards that embrace both shore protection/resiliency and habitat creation for shorebirds, horseshoe crabs and other coastal species along the Atlantic and Delaware Bay coasts.

9.3.3.16 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.24 Develop a plan to improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

9.3.3.25 Develop a habitat management plan focused on areas important to near-shore, coastal species (e.g., herring, sturgeon, terrapin, nesting birds) that prioritizes these areas to direct resources to minimize the impacts of sea-level rise, flooding and storms (including extreme rain events) such as increased erosion of beach, mudflat and marsh habitats, and the increased risk of saltwater intrusion into freshwater habitats. Gather "best information" for spatial modeling of anticipated habitat shifts from sea-level rise, flooding, etc.

9.3.3.28 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.3.32 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.11 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed offshore energy projects relating to drilling, extraction and distribution of petroleum and gas products to reduce habitat destruction and minimize impacts on wildlife.

11.1.1.13 Use the best available science (species data, habitat present, wind farm layout options, wind blade impacts on migratory species, location of migration routes, etc.) when conducting regulatory reviews of proposed wind farm projects to minimize impacts on migratory and resident wildlife and reduce habitat fragmentation.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.20 Provide educational resources and technical support to public and private landowners and land managers to promote the protection and/or enhancement of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.4 Provide educational resources, training programs, and on-the-ground guidance to dredging companies and resource managers on habitat creation and enhancement away from and outside of shipping lanes, and to identify seasonal timing of activities that would minimize impacts to wildlife and their habitats.

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

100 Law and Policy

100. Legislation

100.1.3 Sub-national Level

100.1.3.4 Initiate legislative action to establish an annual budgetary line item designating funds to support programs and monitoring stations throughout Barnegat, Little Egg Harbor and Great Bay focused on long-term monitoring of submerged aquatic vegetation, both native and exotic species.

100.1.4 County and Local

100.1.4.8 Secure critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through local ordinances.

100.1.5 Scale Unspecified

100.1.5.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into state/local policy to minimize the impact of aquaculture on fish and wildlife.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.1 Develop (and/or improve) policies and/or regulations that will promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

100.3.0.2 Improve policies/regulations aimed at protecting and preserving critical coastal and marsh habitats and securing mitigation for losses that create an environmental benefit.

100.3.0.4 Promote policies and regulations that support marine conservation zone designations in suitable areas identified through research and literature.

100.3.0.7 Amend current policies and/or regulations to increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.23 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.26 Adopt regulations requiring the combined sewer overflow alternative analyses required by regulation address potential impacts to wildlife in watercourses or receiving water bodies.

100.3.0.27 Amend harvest, license and/or permit requirements to incorporate guidance regarding the use of gear and/or tackle and current best practices to minimize bycatch or entanglement of non-target species.

100.3.0.28 Amend harvest, license and/or permit requirements to require mandatory reporting by permittees/licensees of lost harvest gear, by-catch and, entanglement of non-target species.

100.3.0.30 Amend the NJ Bureau of Marine Fisheries commercial licensing and harvest reporting system to require fishermen to report the number and location of lost pots to the appropriate state agency/agencies at the end of the harvest season.

100.3.0.37 Develop a law and/or policy that requires NJ DEP to continue to address and correct the allowable combined sewer overflow inputs of solid waste into the marine environment to minimize harm to wildlife and their habitats.

100.3.0.38 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.3.0.39 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.49 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address the issue of disturbance to habitat or species as a result of human activities (e.g., construction, bridge maintenance, road work, etc.).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.59 Develop regulations that when implemented will increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.7 Develop a law and/or policy that requires NJ DEP to continue to address and correct the allowable combined sewer overflow inputs of solid waste into the marine environment to minimize harm to wildlife and their habitats.

100.4.0.10 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.4.0.11 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.4.0.21 Ensure that Section 303(d) of the Clean Water Act and applicable State statutory/regulatory requirements for surface water pollutant budgets are being met by monitoring and enforcing regulatory Total Maximum Daily Load (TMDL) targets established within regional Water Quality Management Plans.

Birds

Beach nesting Birds

Focal species that comprise this Conservation Target:

American Oystercatcher | Black Skimmer | Least Tern
Piping Plover

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.1.2 Residential development using materials that cause collision hazards (Avg. Score: 1.00)

NJ Specific Threats: 1.1.2.1 Collision risk to volant species (birds, bats and invertebrates).

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 1.2.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.

1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.2.2 Commercial development using materials that cause collision hazards (Avg. Score: 2.00)

NJ Specific Threats: 1.2.2.1 Collision risk to volant species (birds, bats and invertebrates).

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats: 1.3.1.2 Loss, alteration and/or degradation of habitat.

1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

3 Energy Production and Mining

3.1 Oil and Gas Facilities and Pipelines

3.1.1 Distribution processes of petroleum and other liquid hydrocarbons (Avg. Score: 1.00)

NJ Specific Threats: 3.1.1.1 Fragments terrestrial and aquatic habitats.

3.1.1.2 Loss, alteration and/or degradation of habitat.

3.1.1.3 Increased risk of oil spills.

3.1.1.4 Increased noise pollution.

3.1.1.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.

3.1.2 Natural gas distribution processes (Avg. Score: 1.00)

NJ Specific Threats: 3.1.2.2 Loss, alteration and/or degradation of habitat.

3.1.2.3 Increased risk of gas leaks and explosions.

3.1.2.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.

3.2 Mining and Quarrying

3.2.4 Sand Dredging (outside shipping lanes) (Avg. Score: 1.00)

NJ Specific Threats: 3.2.4.1 Loss, alteration and/or degradation of benthic marine habitats.

3.2.4.2 Increased noise pollution.

3.2.4.3 Potential for direct mortality of benthic organisms.

3.3 Renewable Energy

3.3.1 Wind Power (Avg. Score: 1.25)

NJ Specific Threats: 3.3.1.1 Turbines, blades, and structure foundations create a collision risk to volant species (birds, bats and invertebrates) and marine animals.

3.3.1.2 Fragments terrestrial habitats.

3.3.1.3 Loss, alteration and/or degradation of habitat.

3.3.1.4 Increased commercial infrastructure.

3.3.2 Solar Power (Avg. Score: 1.00)

NJ Specific Threats: 3.3.2.2 Loss, alteration and/or degradation of habitat.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.1.2 Movement of cars and other vehicles on roads and railroads (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 4.1.2.1 Increased vehicle traffic increases the risk of wildlife mortality from strikes.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads (Avg. Score: 1.00)

NJ Specific Threats: 4.2.1.5 Tall radio and utility towers with guy lines pose a strike hazard for migrant bats and birds, especially in poor visibility conditions (e.g., fog, nighttime, poor weather conditions).

4.3 Shipping Lanes

4.3.2 Dredging impacts (Avg. Score: 1.25)

NJ Specific Threats: 4.3.2.2 Historic and current reuse of containment facilities over time may disrupt/displace nesting birds.

4.3.2.3 Transportation of materials to and from disposal facilities may pose temporary disturbance to wildlife impacting foraging and nesting success.

4.4 Flight Paths

4.4.1 Airplane flight paths (Avg. Score: 1.00)

NJ Specific Threats:
- 4.4.1.1 Increased noise disturbance to wildlife, disrupting their normal behaviors.
- 4.4.1.2 Increased risk of collision between airplanes and birds, bats and insects.

5 Biological Resource Use

5.4 Fishing and Harvesting of Aquatic Resources

5.4.2 Intentional Use (large scale) (Avg. Score: 0.50)

NJ Specific Threats:
- 5.4.2.1 Overharvesting of one species may lead to detrimental impacts on another; e.g., overharvest of menhaden affecting piscivorous birds.

5.4.3 Unintentional effects (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats:
- 5.4.3.1 Abandoned fishing tackle and gear, crab pots without excluders and ghost crab pots increase the risk of injury and death to marine mammals, sea turtles, sea birds, pinnipeds and fish species as well as terrestrial and semi-aquatic species as a result of consuming tackle or gear, entrapment and entanglement in gear.
- 5.4.3.2 Commercial/recreational shellfish dredging may impact marine ecosystems by uprooting submerged aquatic vegetation, disrupting substrates, increasing turbidity, and increasing predator species in localized areas.
- 5.4.3.3 Heavy fishing pressure in localized areas can prevent foraging birds from hunting prime areas decreasing their likelihood of success and reproduction.
- 5.4.3.6 Fishing gear used by commercial fisheries results in bycatch or entanglement of non-targeted wildlife leading to injury and/or mortality.

5.4.4 Unintentional effects (large scale) (Avg. Score: 0.75)

NJ Specific Threats:
- 5.4.4.2 Commercial/recreational shellfish dredging may impact marine ecosystems by uprooting submerged aquatic vegetation, disrupting substrates, increasing turbidity, and increasing predator species in localized areas.
- 5.4.4.3 Heavy fishing pressure in localized areas can prevent foraging birds from hunting prime areas decreasing their likelihood of success and reproduction.
- 5.4.4.5 Fishing gear used by commercial fisheries results in bycatch or entanglement of non-targeted wildlife leading to injury and/or mortality.
- 5.4.4.6 Overexploitation of riparian, estuarine, and marine fisheries may deplete food resources required by marine mammals, sea turtles, marine fish and piscivorous birds, in turn resulting lower reproduction and survival.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized) (Avg. Score: 3.00)

NJ Specific Threats:
- 6.1.1.1 Inappropriate use of off-road vehicles creates new roads/trails which fragments habitat.
- 6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.
- 6.1.1.3 Increased risk of harassment that results in a change in wildlife behavior and/or direct mortality from vehicle strikes.
- 6.1.1.4 Increased noise pollution.
- 6.1.1.5 Vehicle use on beaches can cause disturbance, harms breeding and foraging habitats, and can cause direct mortality of beach-nesting birds.

6.1.1.6 Off-road vehicles can be a mechanism of transference of wildlife diseases and invasive plant species if gear and apparel are not properly sanitized between sites.

6.1.2 Boating (Avg. Score: 2.25)

NJ Specific Threats: 6.1.2.1 Alteration and/or degradation of aquatic habitat.

6.1.2.2 Increased disturbance to marine animals and ocean-, bay- and marsh-associated birds which can alter their behavior decreasing the likelihood of their success and/or reproduction.

6.1.3 Use of beaches (Avg. Score: 3.00)

NJ Specific Threats: 6.1.3.1 Increases disturbance to beach nesting birds that reduces nesting success, and reduces foraging and resting opportunities for a wide range of nesting and migrating shorebirds.

6.1.5 Wildlife observation and photography (Avg. Score: 2.00)

NJ Specific Threats: 6.1.5.1 Improperly conducted recreational activities may disrupt normal wildlife behaviors which can result in reduced reproductive success or survival, abandonment of critical sites, etc.

6.1.7 Other (Avg. Score: 1.00)

NJ Specific Threats: 6.1.7.1 Use of recreational or commercial pyrotechnics may cause temporary disturbance to wildlife, in particular to nesting birds.

6.1.7.3 Drone use in areas with sensitive wildlife (e.g., nesting and foraging birds, migrating and foraging/feeding whales) can alter their behavior and can cause disturbance that impacts their reproductive and/or foraging success.

6.2 Military Exercises

6.2.1 Military exercises (Avg. Score: 1.00)

NJ Specific Threats: 6.2.1.1 Military testing and training exercises may inflict disturbance and potential physical harm to wildlife.

6.3 Work and Other Activities

6.3.1 Unauthorized research projects at significant habitats (Avg. Score: 2.00)

NJ Specific Threats: 6.3.1.2 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.1.3 Activities conducted without proper precautions may disturb and disrupt normal wildlife behaviors, which may impact reproductive success or survival, cause abandonment of critical sites, etc.

6.3.2 Authorized research projects at significant habitats (Avg. Score: 1.00)

NJ Specific Threats: 6.3.2.3 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.2.4 Activities conducted without proper precautions may disturb and disrupt normal wildlife behaviors, which may impact reproductive success or survival, cause abandonment of critical sites, etc.

6.3.3 Other "work" unrelated to research (Avg. Score: 3.00)

NJ Specific Threats: 6.3.3.1 Construction projects may disrupt normal wildlife behavior which can result in reduced reproductive success or survival, abandonment of critical sites, etc. (e.g., bridge-nesting birds).

6.3.3.2 Intensive dune and beach management (including overuse of dune fencing, sand mining, mechanical beach raking, storm clean up), reduces foraging habitat for beach nesting and migratory shorebirds, and poses risks of injury and mortality to unfledged chicks.

6.3.3.3 Beach nourishment projects create suitable habitat for beach-nesting birds in areas of high human use, increasing the likelihood of disturbance to the birds, harm to the eggs, and injury and/or mortality to chicks.

7 Natural Systems Modifications

7.3 Other Ecosystem Modifications

7.3.1 Shoreline Stabilization (Avg. Score: 3.00)

NJ Specific Threats: 7.3.1.1 Efforts to stabilize barrier islands and shorelines, including jetties, groins, bulkheads, interfere with the natural geological processes needed to create and maintain high quality habitat for beach strand species.

7.3.4 Lack of natural disturbance patterns or ecosystem functions due to species loss (Avg. Score: 2.00)

NJ Specific Threats: 7.3.4.4 Human interference in natural processes such as clean up (e.g., beach-filling, shoreline hardening, tree/log removal from forests) after storms, in particular those causing post-hurricane washover and/or barrier island westward movement, and tree felling limits the disturbance needed to maintain appropriate habitats for wildlife.

7.3.5 Poor habitat management (Avg. Score: 3.00)

NJ Specific Threats: 7.3.5.5 Habitat management that alters or removes vegetation without implementing long-term management increases the risk of invasive and exotic plants establishing themselves, outcompeting native vegetation.

7.3.5.6 Habitat management, including that which occurs on public and private lands, that does not consider timing and species' behaviors can result in the direct mortality and/or alteration or loss of habitat.

7.3.5.13 Private landowners with rare species on their properties are not always cooperative in the protection and management of the species' habitats. Landowners may be held accountable for their actions when they cause harm to the species or destroy the habitat, but it is often too late for the species' population.

7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

7.3.5.16 Lack of proactive management to preserve or maintain viable and functioning marshes for SGCN wildlife.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species (Avg. Score: 3.00)

NJ Specific Threats: 8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.

8.1.1.4 Invasive, non-native animals increase the risk of predation on native animals and/or herbivory on native vegetation.

8.1.1.6 Invasive, non-native plants may create physical barriers for some species.

8.1.4 Invasive non-native terrestrial/wetland animals (Avg. Score: 3.00)

NJ Specific Threats: 8.1.4.2 Free-roaming and feral domestic animals such as cats and dogs causes direct mortality of wildlife and disturbance to wildlife breeding and resting areas.

8.1.5 Invasive non-native terrestrial/wetland plants (Avg. Score: 2.00)

NJ Specific Threats: 8.1.5.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.2 Problematic Native Species/Diseases

8.2.1 Unspecified Species (Avg. Score: 3.00)

NJ Specific Threats: 8.2.1.4 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.2.2 Named Species (Avg. Score: 3.00)

NJ Specific Threats: 8.2.2.1 Dogs on beaches create severe disturbance to beach nesting birds and reduce their nesting success.

8.2.2.2 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.5 Viral/Prion-induced Diseases

8.5.2 Named Species (Disease) (Avg. Score: 1.00)

NJ Specific Threats: 8.5.2.1 Diseases such as West Nile Virus, arenavirus, sudden oak death, Avian Influenza, and snake fungal disease cause morbidity or mortality to native populations.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.1 Domestic and Urban Waste Water

9.1.1 Sewage (Avg. Score: 1.00)

NJ Specific Threats: 9.1.1.1 Degradation of aquatic and marine water quality and habitats by changing turbidity, flow and water chemistry.

9.1.2 Run-off (Avg. Score: 1.00)

NJ Specific Threats: 9.1.2.2 Contaminants degrade aquatic and marine water quality and can bioaccumulate in benthic organisms, threatening wildlife by causing developmental and behavioral abnormalities and reproductive failure.

9.1.2.3 Contaminants from road runoff (oil, sediment, salt, etc.) impact native vegetation and the species that rely upon them, degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2 Industrial and Military Effluents

9.2.1 Oil Spills (Avg. Score: 1.00)

NJ Specific Threats: 9.2.1.1 Oil spills render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.1.2 Oil spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.1.3 Oil spills cause external oiling of wildlife and ingestion of oil, both of which can injure or kill wildlife.

9.2.3 Other (Avg. Score: 1.00)

NJ Specific Threats: 9.2.3.1 Point and nonpoint source pollution such as polychlorinated biphenyls (PCBs), pesticides, heavy metals, and endocrine disrupting compounds (EDC's) into freshwater and marine systems pose threats to wildlife through direct contact and/or ingestion, and to aquatic species and their predators through bioaccumulation, impacting the reproductive success and neurological function of many avian and fish species.

9.2.3.2 Chemical spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.3.3 Chemical spills may render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.3 Agricultural and Forestry Effluents

9.3.3 Herbicides and Pesticides (Avg. Score: 1.00)

NJ Specific Threats: 9.3.3.1 Pesticides degrade terrestrial and aquatic habitats, especially streams, ponds and wetlands. Aquatic wildlife are particularly sensitive to these contaminants, which can cause developmental and behavioral abnormalities and reproductive failure. Some contaminants may bioaccumulate in predatory fish and birds and disrupt reproduction.

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture (Avg. Score: 1.00)

NJ Specific Threats: 9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.4 Garbage and Solid Waste

9.4.1 Direct hazards to wildlife (Avg. Score: 2.00)

NJ Specific Threats: 9.4.1.1 Wildlife may ingest garbage causing choking or impingement in the digestive system, or they may become physically entangled in it (e.g., plastic or abandoned fish nets); conditions that make them unable to feed or drink, cause them to suffocate or drown, or otherwise restrict the animal's movement making them more susceptible to predators, starvation or injury.

9.5 Air-Bourne Pollutants

9.5.1 Acid Rain (Avg. Score: 1.00)

NJ Specific Threats: 9.5.1.1 Causes acidification of water bodies, resulting in changes to aquatic and marine communities and reducing biodiversity, and creating conditions that are unsuitable for some aquatic (freshwater and marine) and semi-aquatic species that are sensitive to pH shifts.

9.5.6 Herbicides and Pesticides (Avg. Score: 1.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

9.6 Excess Energy

9.6.1 Light Pollution (Avg. Score: 2.00)

NJ Specific Threats: 9.6.1.1 Artificial lighting can reduce suitability of adjacent habitat for species sensitive to artificial lights by disorienting wildlife, reducing foraging suitability or success, or increasing visibility to predators, resulting in reduced diversity and/or productivity of species in adjacent habitat.

9.6.3 Noise Pollution (Avg. Score: 2.00)

NJ Specific Threats: 9.6.3.1 Acute and chronic noise pollution in and adjacent to terrestrial and aquatic (marine and freshwater) environments could disrupt normal behaviors of wildlife such as migration, communication, feeding, eluding predators, resting and breeding, etc.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 1.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.2 Droughts

11.2.1 Droughts (Avg. Score: 1.00)

NJ Specific Threats: 11.2.1.3 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

11.3 Temperature Extremes

11.3.1 Temperature extremes (Avg. Score: 2.00)

NJ Specific Threats: 11.3.1.1 Increasing temperatures may cause habitat loss and degradation by desiccating and/or raising the temperatures of small wetlands and streams leading to the loss of freshwater mussels and other aquatic species and species reliant upon these habitats.

11.3.1.2 Increased temperatures can negatively impact wetland, riverine, lacustrine and vernal pool-associated or -dependent wildlife by reducing flows, increasing water temperatures, lowering water levels and causing premature drying of vernal habitats.

11.3.1.3 Temperature extremes of surface water and air degrades marine habitats and ecosystems, threatening marine wildlife. Such extremes also disrupt offshore currents and migratory patterns, species' ranges, and/or impact communities/food chains, all of which further impact the ecosystem.

11.3.1.4 Extremely low temperatures and/or extensive periods of unseasonably low temperatures during critical life history stages (e.g., hibernation, gestation/nesting) can alter animals' behaviors and decrease survivorship.

11.4 Storms and Flooding

11.4.1 Storms and flooding (Avg. Score: 3.00)

NJ Specific Threats:

11.4.1.1 Extreme storms and flooding events threaten aquatic and marine wildlife through habitat degradation and alteration, including alterations to off-shore or back-bay benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic and marine wildlife.

11.4.1.2 Potentially damage coastal habitats, including beach- and marsh-nesting bird habitats and interdunal wetlands, and can increase marsh erosion.

11.4.1.6 Increased storms and flooding reduce nesting success, especially for ground-nesting birds.

11.4.1.7 Potentially damage coastal habitats, including beach and marsh habitats used by spawning horseshoe crabs, nesting diamondback terrapins, and resting and foraging birds.

11.4.2 Increased rainfall (Avg. Score: 2.00)

NJ Specific Threats:

11.4.2.1 Extreme rain events threaten aquatic wildlife through habitat degradation and alteration, including alterations to benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic wildlife.

11.4.2.2 Extreme rain events can damage wildlife nesting and resting habitats, including impacts to avian eggs and chick and small mammal survivorship.

11.4.2.3 More frequent rain events can alter terrestrial and wetland vegetation communities as well as wetland hydrology, shifting wildlife community use.

11.6 Phenology Shifting or Alteration

11.6.2 Phenology shifts related to predator-prey ecology (Avg. Score: 2.00)

NJ Specific Threats:

11.6.2.1 Alters inter-specific relationships (e.g., competition, parasitism, predation) of wildlife, ultimately leads to detrimental impacts on the ecological system.

11.6.2.2 Shifts timing of species migration, breeding and hibernation, and available food resources, causes redistribution of species, or mortality for species that are unable to relocate due to their already isolated habitat or limited mobility.

11.6.3 Phenology shifts related to species redistribution (Avg. Score: 1.00)

NJ Specific Threats:

11.6.3.1 Shifts in timing of species migration, breeding and hibernation, and available food resources, as a result of wildlife range shifts driven by climate change.

11.6.3.2 Shifts in nesting times or egg incubation durations can limit nest success and longterm populations.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 1.75)

NJ Specific Threats:

12.1.1.4 Lack of information on the morphometrics and trends of coastal salt marshes and salt marsh islands.

12.1.1.5 Lack of information regarding the SGCN populations that use managed salt marshes and the best techniques for making improvements for marsh-dependent SGCN wildlife.

12.1.1.6 Lack of information regarding migratory pathways and response of wildlife to lights and noise associated with offshore wind turbines.

12.1.3 Need to answer research question (Avg. Score: 3.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.3.4 Lack of information regarding the potential short- and long-term impacts of wind turbines and other tall coastal structures on migratory populations.

12.1.4 Need to develop new technique (Avg. Score: 1.50)

NJ Specific Threats: 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.

12.1.4.3 Lack of techniques for high marsh preservation that includes impoundments and elevated islands.

12.1.4.4 Lack of consideration of habitat management opportunities in the course of salt marsh management for mosquito control.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 2.00)

NJ Specific Threats: 12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 1.00)

NJ Specific Threats: 12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.

12.4.0.3 Lack of internal understanding regarding beneficial habitat impacts of storm events leads to policies and practices that reverse or decrease such beneficial effects (e.g., beach-filling, shoreline hardening, “hazard” tree and log removal from forests, etc.

12.4.0.6 Techniques for ecological management or restoration of shorelines are not fully developed or evaluated for effectiveness for target and non-target SGCN in coastal areas.

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 3.00)

NJ Specific Threats: 14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 3.00)

NJ Specific Threats:

14.2.1.3 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various coastal management practices.

14.2.1.4 Need to develop greater understanding of and support for efforts implemented to maintain disturbance-free habitats that allow coastal wildlife populations to thrive alongside human residential and recreational uses.

14.2.1.5 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various wetland management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 2.00)

NJ Specific Threats:

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.1 Enhance critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates through incentive programs with adjacent private landowners to increase the effective size of the habitat.

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.3 Secure and promote the protection/restoration of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through incentive programs.

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.14 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of herbicides and pesticides, and implementing more ecologically safe strategies when using such products.

1.2.1.16 Create incentives (non-monetary and/or monetary) within State regulations (mitigations requirements or credit, BMP satisfaction, etc.) to promote the use of retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.17 Develop a public-relations oriented certification program for private retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.18 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and land managers to control and reduce the impacts of invasive, native and non-native species in order to increase structural habitat diversity.

1.2.1.20 Coordinate across government agencies and non-government organizations to create or expand upon tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMP's.

1.2.1.23 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to provide cost shares and/or plan approvals for management based on management approaches and prescriptions.

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

1.2.1.27 Create legislation to re-instate incentives for citizens bringing their own shopping bag(s) to grocery stores in an effort to decrease the amount of plastic shopping bags in circulation.

2 Direct Management of Natural Resources

2.1 Create new habitat or natural processes

2.1.1 Habitat conversion

2.1.1.2 Utilize dredged materials to create marsh islands to provide nesting habitat for birds and marine turtles.

2.6 Hazard or infrastructure removal

2.6.6 Shoreline armoring removal

2.6.6.1 Remove shoreline armoring to reduce its impacts on aquatic habitats.

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.2 Develop, implement, monitor and evaluate pest control/management strategies to reduce the impacts of over-abundant wildlife species (native and/or native, invasive species) on native vegetation and the degradation of habitats supporting SGCN. Over-abundant wildlife species include but are not limited to mute swans, Canada geese, beaver and white-tailed deer.

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.5 Implement biologically safe and appropriate control/management strategies, and where appropriate, eradication strategies to reduce the impacts and/or limit the distribution of invasive and/or non-native plant species within or near aquatic systems using methods that will provide the most protection to the aquatic and riparian ecological system, and minimize disturbance to the soil and wildlife. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.8.0.6 Implement long-term management of invasive and/or non-native plants to help maintain functioning ecological systems and biological diversity, and to enhance travel corridors. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.9 Living shorelines

2.9.1 Beach renourishment

2.9.1.1 Implement best management practices for using mined sand or dredged material to improve habitat for wildlife, particularly for spawning horseshoe crabs and migrating shorebirds.

2.9.1.3 Where beach renourishment projects are deemed necessary, implement such projects with a design to increase availability of nesting and foraging habitat for beach nesting birds.

2.9.1.4 Implement beach renourishment strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimizes harm to wildlife, particularly SGCN.

2.9.1.5 Expand the acreages and enhance the effective size of SGCN habitats by utilizing beach renourishment to restore adjacent, less optimal or unsuitable, habitats.

2.9.1.6 Reclaim degraded rare species habitats using beach renourishment, when appropriate, to restore habitat value for the documented/target SGCN.

2.9.1.7 Protect significant natural and/or unique communities by implementing best management practices for beach renourishment, when applicable.

2.9.1.8 Minimize habitat loss of critical coastal beach habitats that provide nesting, migrating, and wintering areas for birds and other coastal species by maintaining or enhancing these areas through beach renourishment.

2.9.1.11 Enhance critical migratory stopover beach habitats for songbirds, raptors, shorebirds, bats and invertebrates through beach renourishment and expand management to adjacent private lands to increase the effective size of the habitat.

2.9.1.12 Implement beach habitat management on state and other conservation lands to enhance food availability for migratory species (birds, bats, invertebrates).

2.9.1.13 Conduct beach renourishment to maintain, enhance and/or create feeding and roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

2.9.1.14 Implement best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated beach habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.9.1.15 Implement beach management strategies to benefit urban-associated SGCN.

2.9.1.16 Prevent or ameliorate near-term impacts of climate change throughout the State but in particular within the coastal and Delaware Bay areas by implementing habitat management strategies that will establish/improve habitat resilience, such as beach renourishment, that benefits wildlife inhabiting these areas.

2.9.2 Erosion control structures

2.9.2.1 Install breakwaters in the form of living shorelines to reduce the impact of wave erosion while preserving the natural character of the site.

2.9.3 Sand dune restoration

2.9.3.1 Prevent or ameliorate near-term impacts of climate change throughout the State but in particular within the coastal and Delaware Bay areas by implementing habitat management strategies that will establish/improve habitat resilience, such as sand dune restoration, that benefits wildlife inhabiting these areas.

2.9.3.2 Implement sand dune restoration strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimizes harm to wildlife, particularly SGCN.

2.9.3.3 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through sand dune restoration.

2.9.3.4 Reclaim degraded rare species habitats using sand dune restoration needed to restore habitat value for the documented/target SGCN.

2.9.3.5 Protect significant natural and/or unique communities by implementing best management practices for sand dune restoration.

2.9.3.6 Minimize habitat loss of critical coastal dune habitats that provide nesting, migrating, and wintering areas for birds and other coastal species by maintaining or enhancing these areas through sand dune restoration.

2.9.3.9 Enhance critical migratory stopover sand dune habitats for songbirds, raptors, shorebirds, bats and invertebrates through sand dune restoration and expand management to adjacent private lands to increase the effective size of the habitat.

2.9.3.10 Implement sand dune restoration strategies on state and other conservation lands to enhance food availability for migratory species (birds, bats, invertebrates).

2.9.3.11 Conduct sand dune restoration to maintain, enhance and/or create feeding and roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State and evaluate the effectiveness of such management.

2.9.3.12 Implement best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated sand dune habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.10 Minimize the loss of important habitats (e.g., coastal scrub-shrub and grassy habitats, high and low marsh habitats, etc.) that provide nesting, migrating, and wintering areas for SGCN birds and other coastal and marsh-dependent species through habitat restoration efforts.

2.10.0.11 Restore and/or enhance critical migratory terrestrial and aquatic habitats (e.g., beach, grasslands, forest, scrub-shrub, etc.) for songbirds, raptors, shorebirds, waterfowl, bats and invertebrates through habitat restoration efforts and expand habitat restoration to adjacent private lands to increase the effective size of the habitat.

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.23 Restore and/or enhance roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through vegetation management.

2.11.0.6 Reclaim degraded rare species habitats by conducting vegetation management needed to restore habitat value for the documented/target SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.9 Minimize habitat loss of critical coastal habitats that provide nesting, migrating, and wintering areas for birds and other coastal species by maintaining or enhancing these areas through vegetation management.

2.11.0.10 Enhance critical migratory stopover beach habitats for songbirds, raptors, shorebirds, bats and invertebrates through vegetation management and expand management to adjacent private lands to increase the effective size of the habitat.

2.11.0.13 Implement best management practices (BMPs), protective strategies, and guidelines for vegetation management to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.11.0.16 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.11.0.23 Implement appropriate habitat management actions in areas where natural disturbances, such as wildfire, have been precluded.

2.11.0.30 Identify and prioritize areas where various management tools (such as increasing salinity through the management of water levels or chemical applications) may be effective in reducing phragmites within and restoring marsh habitat.

2.11.0.33 Increase structural habitat diversity by implementing long-term vegetation management to minimize the potential for the establishment of invasive and/or non-native plants that may outcompete native vegetation.

2.11.0.35 Increase structural habitat diversity by managing vegetation adjacent to aquatic habitats in a manner that provides a buffer from runoff and erosion and a microclimate to stabilize seasonal temperatures to benefit a variety of aquatic and semi-aquatic species.

2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.

2.11.0.41 Increase structural habitat diversity through the implementation of a variety of vegetation management practices such a prescribed burns (either increasing or decreasing their frequency depending on the site and objective), plantings, etc. that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.44 Manage phragmites adjacent to coastal marshes of interest, in particular those that are within underdeveloped areas and are unprotected, through herbicide application and water management to improve resiliency of the marshes to sea level rise.

2.12 Water management

2.12.1 Ditch plugs

2.12.1.1 Implement best management practices (BMPs), protective strategies, and guidelines for ditch plugging to maintain and enhance healthy, resident and migratory SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.12.2 Diversion/headgate

2.12.2.1 Prevent or ameliorate near-term impacts of climate change throughout the State but in particular within the coastal and Delaware Bay areas by implementing habitat management strategies that will establish/improve habitat resilience, such as using diversions, that benefits wildlife inhabiting these areas.

2.12.3 Drainage

2.12.3.3 Remove tile drains and drainage ditches to improve wetland hydrology and restore natural stream flows during appropriate times to avoid sensitive periods (e.g., nesting, denning, roosting) and minimizes harm to wildlife, particularly SGCN.

2.12.3.4 Expand the acreages and enhance the effective size of SGCN habitats by reclaiming/restoring adjacent, degraded habitats by removing tile drains and drainage ditches.

2.12.3.6 Protect significant natural and/or unique communities by and when removing tile drains and drainage ditches.

2.12.3.7 Minimize habitat loss of critical coastal habitats that provide nesting, migrating, and wintering areas for birds and other coastal species by maintaining or enhancing these areas by removing drainage ditches.

2.12.3.8 Enhance critical migratory stopover beach habitats for songbirds, raptors, shorebirds, bats and invertebrates by removing drainage ditches and expanding management to adjacent private lands to increase the effective size of the habitat.

2.12.3.9 Implement drain removal on state and other conservation lands to enhance food availability for migratory species (birds, bats, invertebrates).

2.12.3.11 Implement best management practices (BMPs), protective strategies, and guidelines when removing tile drains and drainage ditches to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.12.6 Tide gate

2.12.6.1 Prevent or ameliorate near-term impacts of climate change throughout the State but in particular within the coastal and Delaware Bay areas by implementing habitat management strategies that will establish/improve habitat resilience, such as tide gates, that benefits wildlife inhabiting these areas.

2.12.8 Watering facilities

2.12.8.2 Manage water levels in impoundments to improve coastal marsh habitat availability to wildlife and improve resiliency of the marshes to sea level rise.

2.13 Wildlife damage management

2.13.0 Nuisance fish and wildlife damage

2.13.0.3 Investigate alternative saltmarsh mosquito control methods that may produce benefits for coastal marsh dependent SGCN wildlife, including but not limited to high-marsh nesting birds and migrating shorebirds and landbirds.

2.13.0.5 Investigate the impacts of human-subsidized and/or naturally occurring predator species on SGCN to assess the need for integrated wildlife damage management techniques (e.g., predator exclosures, fish blockages, electric fence, culls) and/or policy changes on state land management that minimize the impacts of human-subsidized predators.

2.13.0.8 Implement and assess management strategies to control and reduce the impacts of detrimental species and diseases that pose threats to native wildlife or communities.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.6 Conduct long-term studies on resident and migratory SGCN to determine if there are changes to the populations' demography (productivity, survival, dispersal) and/or to their critical and/or supporting habitats (i.e., diminishing in value, acreage or connectivity, etc.), in particular changes that would not maintain SGCN at viable levels for species populations. Update data and GIS maps; provide updated information to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.9 Identify SGCN (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources, and compile/collect and evaluate data/information regarding potential management strategies to improve the availability of such SGCN's food resources.

3.0.0.10 Conduct long-term studies to evaluate the effectiveness of management strategies implemented to enhance food/prey availability for SGCN [whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources] through studies that investigate the populations and health of the food resources as well as the target SGCN. Revise management strategies as needed and continue to monitor the effectiveness of the efforts.

3.0.0.11 Develop, implement and evaluate the effectiveness of town plans that avoid impacts to SGCN species and their habitats.

3.0.0.14 Identify areas with invasive, aquatic plants and animals and collect a detailed baseline assessment of the species' status and distribution. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort. Researchers and contractors performing Forest Stewardship Inventories and/or Plans on state lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.0.0.15 Conduct long-term monitoring of areas identified as having invasive, aquatic plants and animals to track the species' status/progress over time with or without the implementation of management strategies. Areas without management strategies should be assessed and prioritized for management/control. Areas where management strategies are being implemented should include an assessment of the management effort and identify/recommend and implement necessary changes to improve its success. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort.

3.0.0.21 Conduct long-term monitoring to determine the impacts of the fish and shellfish aquaculture industries on focal and non-focal SGCN and their habitats (i.e., NJ bays, estuaries, ocean areas). Assess the success of management actions implemented to minimize these impacts and make specific recommendations to the NJ DEP regarding how such management efforts may be improved to minimize harm to wildlife and their habitats.

3.0.0.25 Identify pathways of migratory SGCN in the Atlantic Coastal and Marine Regions (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and use the data to help evaluate the potential short- and long-term impacts of wind turbines, radio towers, utility guy lines, and other tall coastal structures on migratory populations.

3.0.0.28 Evaluate best management practices for using mined sand or dredged material to improve habitat for wildlife, particularly for spawning horseshoe crabs and migrating shorebirds.

3.0.0.30 Conduct research to investigate the feasibility of managing and/or creating roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

3.0.0.31 Conduct short- and long-term studies (e.g., wildlife surveys and habitat assessments) to evaluate the effectiveness of vegetation management efforts to maintain, enhance and/or create roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.2 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.0.5 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

3.2.0.8 Implement and conduct long-term monitoring of control measures aimed at minimizing the impacts of problematic species and/or diseases to evaluate the effectiveness of such efforts and to identify and incorporate additional strategies as appropriate.

3.2.0.17 Conduct monitoring at constructed wind farms (within or outside of NJ) to assess the impacts on migratory species (birds, bats, insects) and determine if NJ's land use planning efforts and/or smart-growth plans need to be revised.

3.2.0.19 Develop, implement and evaluate aquaculture practices in coastal areas that are compatible with the recovery of SGCNs and industry needs.

3.2.0.20 Evaluate the effectiveness of BMPs for mosquito control methods that may produce benefits for coastal marsh dependent SGCN wildlife, including but not limited to high-marsh nesting birds and migrating shorebirds and landbirds.

3.2.0.24 Develop, implement and evaluate the effectiveness of BMPs for lighting of/on tall structures that minimize harm to and/or disorient wildlife, in particular but not limited to migratory birds, bats and invertebrates. Implement BMPs into state, county and local permitting processes.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.2 Age, size and sex structure

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.4 Food habits

3.2.4.1 Monitor and investigate the populations and health of SGCN prey/food resources for those SGCN whose populations are thought to be limited due wholly or in part to a lack of food resources or toxins in food resources.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.14 Compile information (obtained through literature reviews, communication with other States along the Atlantic coast, academia, etc.) regarding the impacts of above water operation of wind turbines on migratory marine birds and bats. Provide data to appropriate governing agencies and/or State commissions for integration into permitting review processes.

3.3.1.16 Gather "best information" for spatial modeling and update/create a current model/depiction of anticipated habitat shifts from sea-level rise, flooding, etc.

3.3.1.19 Identify and codify legal ORV access areas on state (and if appropriate, other conserved) lands. Provide GIS mapping to the landowner for potential use in directing such recreational activities.

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.1.22 Identify, assess and prioritize marsh habitats for restoration where various management tools (such as increasing salinity through the management of water levels or chemical applications) may be effective in reducing the presence of phragmites.

3.3.1.23 Identify areas (through surveys/studies, predictive modeling, review of available data, enlistment of habitat management and/or species experts, etc.) where the State can allow coastal marsh migration due to sea level rise, and target these areas for land acquisition and/or land management to accommodate this transition. Targeted areas should include underdeveloped areas adjacent to unprotected coastal marshes.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.1.28 Identify key habitats for the potential allowance of natural coastal processes without interfering through shoreline stabilization, etc. and evaluate the risks and benefits if coastal migration was permitted to occur naturally. Create a GIS map of the identified areas; provide the assessment and mapping to local towns and other appropriate governing agencies.

3.3.1.29 Identify coastal wildlife habitats unimpacted by development and/or at greatest risk of habitat loss to help guide enlightened coastal stabilization efforts (i.e., use of soft stabilization) to reduce the impacts on wildlife and their habitats.

3.3.2 Monitoring

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.10 Evaluate the efficacy and success of different management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.3.2.15 Investigate the effectiveness of management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.3.2.19 Once baseline data on the marsh islands' and associated SGCN species' vulnerability to inundation is completed, continue to conduct long-term monitoring the islands to determine sustainability for wildlife dependent on these areas.

3.3.2.20 Once a system is developed for reporting and qualifying new locations of invasive species, develop, implement and monitor/evaluate invasive species removal strategies at identified locations. Priority should be given to those areas critical to SGCN and/or contain unique and/or rare plant communities supporting SGCN and/or other fish/wildlife species.

3.3.2.22 Conduct short- and long-term monitoring of the current natural processes affecting sediment transport along the coast. Share findings with organizations/agencies attempting to design beach nourishment projects in a manner that will be beneficial to wildlife.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.2 Develop management strategies to improve the availability of prey/food resources for SGCN whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources. Monitor and investigate the management strategies over time to determine success and/or the need to revise methods.

3.5.3.5 Develop best management practices for using mined sand or dredged material to improve habitat for wildlife, particularly for spawning horseshoe crabs and migrating shorebirds.

3.5.3.8 Develop best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.13 Developing engineering standards that embrace both shore protection/resiliency and habitat creation for shorebirds, horseshoe crabs and other coastal species along the Atlantic and Delaware Bay coasts.

3.5.3.14 Develop aquaculture practices in the coastal areas that are compatible with the recovery of SGCN.

3.5.3.16 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.3.21 Develop management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.24 Based on research, modify management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.1 Develop studies to evaluate management strategies to improve the availability of prey/food resources for SGCN whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources. Monitor and investigate the management strategies over time to determine success and/or the need to revise methods.

3.5.4.10 Develop BMPs for lighting of/on tall structures that minimize harm to and/or disorientation of wildlife, in particular but not limited to migratory birds, bats and invertebrates.

3.5.4.13 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.4.14 Develop and implement agreements, and update existing agreements, with government agencies regarding the protection of critical SGCN habitats (e.g., significant breeding populations of beach nesting birds, colonial waterbird nesting areas, bat colonies, etc.).

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.17 Investigate new, non-invasive techniques for SGCN population evaluation through literature review, expert opinion, trial studies (if low risk), etc.

3.5.4.18 Investigate the effectiveness of survey techniques through selected “ground truthing” and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

4 Education

4.1 Educator/Instructor training

4.1.1 Aquatic resource education

4.1.1.1 Provide educational resources and training programs to teachers in aquatic resource education that includes information regarding climate change and sea-level rise for incorporation into the class curriculum and/or as the focus of school field trips.

4.1.1.2 Provide educational resources and training programs to teachers in aquatic resource education that includes information regarding how coastal stabilization negatively impacts wildlife by preventing natural processes for incorporation into the class curriculum and/or as the focus of school field trips.

5 Facilities and Areas

5.15 Wildlife Management Areas

5.15.6 Roads

5.15.6.1 Clearly post areas/roads where vehicle access is permitted.

5.15.6.2 Clearly post areas/trails where vehicle access is not permitted.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.1 Enhance and increase the effective size of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates by securing adjacent habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.3 Secure and protect riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.5 Secure and protect critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.1 Promote the protection of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates and enhance these lands by increasing the effective size through conservation area designations of stopover habitats and adjacent private lands.

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.3 Increase the protection of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through conservation area designations.

6.3.0.5 Promote the protection of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through conservation area designations.

6.3.0.9 Promote the protection of critical marine habitats for SGCN through conservation area designations.

7 Law Enforcement

7.1 Law enforcement

7.1.2 National Level

7.1.2.1 Enforce regulations to protect nesting bird colonies from human disturbance.

7.1.3 Sub-national Level

7.1.3.2 Increase the number of law enforcement officers tending to wildlife issues to a reasonable number to sufficiently cover the State and marine waters.

7.1.4 Scale Unspecified

7.1.4.1 Improve enforcement of policies and/or regulations that promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

7.1.4.2 Restrict human activity from staging areas for red knots and other migratory shorebirds through increasing law enforcement presence.

7.1.4.3 Increase law enforcement presence proximate to sensitive areas [e.g., avian nesting sites, in particular rookeries, and reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively)] to deter human activity and subsequent disturbance to SGCN.

7.1.4.4 Improve enforcement of policies/regulations aimed at protecting and preserving critical coastal and marsh habitats, and secure mitigation for losses that create an environmental benefit.

7.1.4.5 Enforce current policies and/or regulations to increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal SGCN, and implement and enforce amended policies/regulations.

7.1.4.6 Recruit law enforcement to assist in the protection and enhancement of SGCN populations, in particular endangered species, through improved awareness of species through trainings, partnerships, and other methods. Information should include but is not limited to: 1) Issues concerning illegal collection of reptiles, 2) Persecution of rare snakes, 3) Illegal recreational activities on public lands (e.g., off-road vehicles) and their impact on wildlife, 4) Identification of sensitive areas, critical sites and/or "hot-spots" for collection.

7.1.4.7 Increase law enforcement presence to enforce regulations governing recreational activities (e.g., the use of personal watercraft and off road vehicles, caving, rock climbing, etc.) on conserved lands and within other sensitive habitats, and discourage activities that cause harm or disturbance to vegetation, wetlands, fish and wildlife.

7.1.4.8 Implement policies that protect critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates.

7.1.4.9 Implement policies that improve and secure habitat connections between conserved SGCN habitats.

7.1.4.10 Implement policies that promotes expanding acreages and enhances the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

7.1.4.11 Implement and enforce policies/regulations that will increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.16 Implement policies that protect and restore riparian areas.

7.1.4.17 Improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

7.1.4.18 Increase law enforcement presence at important nesting areas on marsh islands to increase the likelihood of boat users acting in a manner that reduces disturbance to birds.

7.1.4.21 Implement regulations for lighting of/on tall structures that will minimize harm to and/or disorientation of wildlife, and enforce within state, county and local permitting processes.

7.1.4.22 Implement policies and/or regulations that prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

7.1.4.25 Encourage the enforcement of municipal laws regulating domestic pets that may predate on wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.2 Develop a team of personnel from government entities, conservation organizations and other stakeholders engaged in oil/gas spill response for marine and freshwater habitats to develop a feasible plan for oil spill response and/or to amend NJ's current oil spill response plan that clearly outlines each organizations responsibilities and an assessment and location list of available equipment for boom deployment during oil spills.

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.1.0.4 Engage government agencies, conservation partners and other stakeholders in constructive dialogues encouraging them to influence policy change and the creation of incentives through a habitat bill and/or municipal ordinances for backyard habitat.

8.1.0.6 Engage government agencies, conservation partners and other stakeholders in discussions focused on sharing information regarding coastal and marine critical wildlife habitats, developing comprehensive mapping to assist in reducing impacts of energy production activities, and establishing a long-term monitoring program to update the data. Ensure this information is available to appropriate personnel for planning or response measures.

8.1.0.12 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting sportsmen's organizations and fisheries, as well as public constituents, addressing the unintended effects fishing gear and tackle can have on wildlife.

8.1.0.16 Engage local governments in discussions regarding the importance of them adopting/passing ordinances which require assessing and addressing secondary impacts (i.e., ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.20 Organize a small focal group of government and non-government agencies/organizations responsible for decisions regarding beach/dune management to share and coordinate their goals so that comprehensive planning can attempt to meet all needs.

8.1.0.21 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation human-subsidized and/or overabundant, native species cause to local nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.22 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation invasive species cause to native nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.33 Engage government agencies, conservation partners and other land managers, communities, landowners, and commercial and industrial stakeholders in discussions regarding the importance of protecting and methods to protect priority wetlands beyond the levels afforded through regulation by maintaining and/or restoring optimal biological buffers around wetlands.

8.1.0.34 Work with the NJ Education Association and Department of Education to design curriculum and outdoor experimental learning opportunities, and provide training to teachers on implementation of these activities.

8.1.0.37 Enlist landowners and NJ citizens in the protection of and survey efforts for SGCN, in particular rare species, by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management and wildlife-related volunteer programs.

8.1.0.39 Deploy stewards at active nesting areas to work with and educate the public on how to reduce disturbance to birds.

8.1.0.40 Encourage researchers, land managers, naturalists and enthusiasts to follow proper procedures for the coordination and/or permitting of research/management activities involving wildlife and sensitive habitats, and discourage activities that alter vegetation or wetlands, or cause harm or disturbance to wildlife.

8.1.0.41 Engage beach-owning entities (e.g., government, non-government and non-profit organizations, and landowners) in a constructive dialogue to develop guidelines for management of beach/dune communities and to ensure that each group is educated and aware of the needs of the other groups.

8.1.0.42 Engage citizens, wildlife observers and photographers through discussions and distributable information regarding the importance of and encouraging implementing responsible and ethical behavior when observing wildlife by developing an alliance of wildlife photographers and widely circulating recommendations on how to reduce impact.

8.1.0.46 Form cooperative partnerships with dredging companies to facilitate habitat creation and enhancement within project areas, and to identify seasonal timing of activities that would minimize impacts to wildlife and their habitats.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.1.0.48 Form cooperative partnerships with transportation and shipment agencies and companies to facilitate habitat creation and enhancement away from and outside of project areas and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.2 Recruitment and retention activities

8.2.3 For wildlife watching

8.2.3.1 Develop and implement nature-focused tourism opportunities including wildlife viewing sites, interpretive signage highlighting unique ecosystems/habitats, and wildlife-related recreational opportunities that do not negatively impact SGCN or their habitats.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.2 Utilize WSFR grant funds, in combination with alternate funding sources as needed, to implement an extensive educational/outreach program consisting of displays, fliers, list-serve mailings, Facebook posts and speaking engagements with sportsmen's organizations and fisheries, as well as public constituents, addressing the unintended effects fishing gear and tackle can have on non-target species.

8.3.0.4 Utilize WSFR grant funds, in combination with alternate funding sources as needed, to implement an extensive educational/outreach program consisting of displays, fliers, list-serve mailings, Facebook posts and speaking engagements with sportsmen's organizations and fisheries addressing the unintended effects abandoned fishing gear, tackle and crab pots can have on wildlife.

8.3.0.6 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners, land managers and local communities to discourage the presence of managed cat colonies and trap, neuter and release programs in wildlife habitats.

8.3.0.7 Develop and provide (or otherwise make publicly available) educational programs and/or materials that describe the negative impacts of off-road vehicles and watercraft use in and adjacent to critical SGCN habitats, and the importance of confining such activities to more appropriate locations and/or seasons.

8.3.0.8 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate recreationists and encourage landowners to eliminate garbage in the vicinity of suitable wildlife habitat, in particular SGCN habitat. Information should include the detrimental impacts garbage may have on various wildlife species.

8.3.0.9 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners and land managers to include only native plants in landscaping and restoration projects. Provide information to assist them in detecting problematic establishment of invasive, non-indigenous plants.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.14 Develop an educational outreach program using a variety of media to ensure maximizing the distribution of information, in particular targeting sportsmen's organizations and fisheries, regarding the unintended effects abandoned fishing gear, tackle and crab pots can have on wildlife, including non-target species.

8.3.0.15 Develop an educational outreach program for citizens regarding: 1) The impacts to wildlife as a result of plastic bags entering aquatic and marine systems, 2) The importance of decreasing the amount of plastic shopping bags in circulation, 3) The need for businesses to voluntarily charge for bags or reimburse people for using their own non-plastic bags, and 4) The need for their assistance through public pressure on legislators and government to pass legislation that that limits the amount of plastic shopping bags in circulation.

8.3.0.19 Develop an educational outreach program for the public on the devastating effects predators can have on native nesting wildlife.

8.3.0.21 Develop an educational outreach program for the general public, in particular those within and adjacent to coastal and riparian areas on the realities of sea-level rise to help citizens living in these areas understand how this will affect them, how coastal stabilization negatively impacts wildlife by preventing natural processes, and how their decisions impact species.

8.3.0.22 Post signage in sensitive coastal habitats (e.g., bird and Diamondback Terrapin nesting areas) to educate the boating community on responsible use of these areas.

8.3.0.23 Develop an educational outreach program for coastal municipalities and residents to promote an understanding of the benefits of soft structures over hard structures for shoreline stabilization.

8.3.0.25 Develop educational outreach programs for landowners, nurseries and the general public regarding the negative impacts of invasive and non-native plants on our natural communities.

8.3.0.27 Develop educational outreach programs for public and private landowners and land managers regarding the importance of structural habitat diversity, methods to increase diversity, and/or incentive programs available to increase habitat diversity.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.8 Develop a plan that focuses on strategies for oil pipelines to avoid sensitive habitats that would be highly impacted by oil spills.

9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.31 Develop wetland restoration plans that consider the life history and needs of wildlife occupying targeted habitats.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.2 Organizational strategic and CMS planning

9.2.1 Organizational strategic and operational planning

9.2.1.1 Identify and codify legal ORV access areas on state lands.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.2 Develop a management plan to improve the availability of prey/food resources for SGCN whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources.

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.6 Amend NJ's current oil spill response plan to 1) expand the geographic area addressed, 2) expand the targeted species impacted and in need of recovery, and 3) revise current and integrate new actions into the plan as needed.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.15 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.2 Listed species recovery planning

9.3.2.1 Develop proactive species recovery plans for all endangered and threatened species including guidance and objectives pertaining to critical and supporting habitat to meet and maintain recovery goals.

9.3.3 Habitat management planning

9.3.3.1 Develop a management plan to improve the availability of prey/food resources for SGCN whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources.

9.3.3.2 Develop a management plan for using mined sand or dredged material to improve habitat for wildlife, particularly for spawning horseshoe crabs and migrating shorebirds.

9.3.3.3 Integrate best management practices (BMPs) regarding dune and beach management into beach nesting bird management agreements with government agencies (and private landowners where necessary).

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.3.12 Develop a management plan using engineering standards that embrace both shore protection/resiliency and habitat creation for shorebirds, horseshoe crabs and other coastal species along the Atlantic and Delaware Bay coasts.

9.3.3.13 Develop a management plan that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas and prevents or ameliorates near-term impacts of climate change throughout the State, but in particular within the coastal and Delaware Bay areas.

9.3.3.16 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.20 Develop an action plan for immediate implementation should habitat levels fall below the minimum necessary size and/or structure within the Cape May Peninsula to sustain the avian migration.

9.3.3.24 Develop a plan to improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

9.3.3.25 Develop a habitat management plan focused on areas important to near-shore, coastal species (e.g., herring, sturgeon, terrapin, nesting birds) that prioritizes these areas to direct resources to minimize the impacts of sea-level rise, flooding and storms (including extreme rain events) such as increased erosion of beach, mudflat and marsh habitats, and the increased risk of saltwater intrusion into freshwater habitats. Gather "best information" for spatial modeling of anticipated habitat shifts from sea-level rise, flooding, etc.

9.3.3.28 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.3.29 Develop habitat management plans aimed at reducing or eliminating negative impacts of ORVs.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.3 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.9 Review strategies for creating or enhancing connectivity (e.g., installing appropriately-sized wildlife passages) between wetlands to allow wildlife to disperse naturally and safely.

11.1.1.12 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed solar farm projects to reduce habitat fragmentation and minimize impacts on wildlife.

11.1.1.13 Use the best available science (species data, habitat present, wind farm layout options, wind blade impacts on migratory species, location of migration routes, etc.) when conducting regulatory reviews of proposed wind farm projects to minimize impacts on migratory and resident wildlife and reduce habitat fragmentation.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.2.2 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.2.4 Review strategies for creating or enhancing connectivity (e.g., installing appropriately-sized wildlife passages) between wetlands to allow wildlife to disperse naturally and safely.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.2 Provide technical support to public and private landowners and land managers for controlling invasive, native and non-native plant species in order to increase structural habitat diversity.

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.0.27 Provide educational resources and presentations to coastal municipalities and residents to promote the understanding of the benefits of soft structures over hard structures for shoreline stabilization.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.1 Engage partners and stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.4 Provide educational resources, training programs, and on-the-ground guidance to dredging companies and resource managers on habitat creation and enhancement away from and outside of shipping lanes, and to identify seasonal timing of activities that would minimize impacts to wildlife and their habitats.

11.2.1.5 Provide educational resources, training programs, and on-the-ground guidance to municipalities, state and federal agency resource managers on tasks such as writing and integrating Beach Management Plans into other management documents.

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

100 Law and Policy

100. Legislation

100.1.3 Sub-national Level

100.1.3.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.3.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.4 County and Local

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.13 Encourage municipal laws regulating domestic pets that may predate on wildlife.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.5.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100.1.5.5 Develop legislation to provide financial support for the New Jersey Invasive Species Strike Team.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.1 Develop (and/or improve) policies and/or regulations that will promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

100.3.0.2 Improve policies/regulations aimed at protecting and preserving critical coastal and marsh habitats and securing mitigation for losses that create an environmental benefit.

100.3.0.3 Develop policies that will promote the long term protection of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates.

100.3.0.4 Promote policies and regulations that support marine conservation zone designations in suitable areas identified through research and literature.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.7 Amend current policies and/or regulations to increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.14 Develop policies and/or regulations that increase the protective buffers of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) to biologically appropriate distances to benefit SGCN that rely upon these habitats and improve the function of the [associated] aquatic systems.

100.3.0.16 Create regulations that restrict human activity from staging areas for red knots and other migratory shorebirds.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.19 Develop regulations for lighting of/on tall structures that will minimize harm to and/or disorientation of wildlife, in particular but not limited to migratory birds, bats and invertebrates. Implement BMPs into state, county and local permitting processes.

100.3.0.20 Develop policies and/or regulations that prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

100.3.0.23 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.27 Amend harvest, license and/or permit requirements to incorporate guidance regarding the use of gear and/or tackle and current best practices to minimize bycatch or entanglement of non-target species.

100.3.0.36 Create legislation to limit the amount of plastic from shopping bags in circulation and re-instate incentives for citizens bringing their own shopping bag to grocery store.

100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.

100.3.0.42 Fully adopt the former Storm water Management Rules' 300ft buffer requirements into the Flood Hazard Area Control Act Rules.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.47 Investigate regulatory options available to direct the location of aquaculture activities in Aquaculture Development Zone 4 (Delaware Bay area) in a manner which minimizes the loss of wildlife habitats and adverse impacts to the environment.

100.3.0.49 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address the issue of disturbance to habitat or species as a result of human activities (e.g., construction, bridge maintenance, road work, etc.).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.56 Develop regulations that when implemented will protect critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates.

100.3.0.57 Develop regulations that when implemented will improve and secure habitat connections between conserved SGCN habitats.

100.3.0.58 Develop regulations that when implemented will promote the expansion of acreages and enhancement of the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.59 Develop regulations that when implemented will increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.64 Develop regulations that when implemented will protect and restore riparian areas.

100.3.0.67 Develop regulations for lighting of/on tall structures that will minimize harm to and/or disorientation of wildlife, and enforce within state, county and local permitting processes.

100.3.0.68 Develop regulations that when implemented will prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

100.3.0.69 Develop regulations that when implemented will minimize wildlife road mortality.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100.3.2 State Land Acquisition Programs

100.3.2.1 Increase opportunities for habitat restoration by making any necessary policy changes to state, federal and local land acquisition programs (e.g., Green Acres, Blue Acres, etc.) to allow for acquisition within abandoned or failing bay shore communities, including mechanisms to relocate displaced people and infrastructure.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.2 Create a policy that requires the NJ DEP to incorporate scientific information regarding climate change and sea level rise (e.g., predictions, habitat management/acquisition efforts to enhance resilience to inundation) on their websites and to work with other government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

100.4.0.16 Develop policies to implement habitat management strategies that will increase the structural diversity surrounding areas used for energy, mining, and transportation and service corridors which include but are not limited to the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-

100.4.0.17 Develop policies to implement habitat management strategies, including prescribed burns, that will increase the structural diversity on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies to control and reduce the impacts of invasive, non-native species in order to increase structural habitat diversity.

100.4.0.18 Develop policies to minimize the extent of infrastructure associated with energy and service corridors or areas (e.g., wind and solar farms, pipelines, utility lines) and that require the implementation of habitat management strategies that will increase the structural diversity in the area including (e.g., the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides).

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.24 Develop policies to provide financial support for the New Jersey Invasive Species Strike Team.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Forest Birds

Focal species that comprise this Conservation Target:

Cerulean Warbler	Kentucky Warbler	Prothonotary Warbler
Scarlet Tanager	Wood Thrush	

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:
- 1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.1.1.2 Loss, alteration and/or degradation of habitat.
- 1.1.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.
- 1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.1.2 Residential development using materials that cause collision hazards (Avg. Score: 2.00)

NJ Specific Threats:
- 1.1.2.1 Collision risk to volant species (birds, bats and invertebrates).

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:
- 1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.2.1.2 Loss, alteration and/or degradation of habitat.
- 1.2.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.
- 1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.2.2 Commercial development using materials that cause collision hazards (Avg. Score: 2.00)

NJ Specific Threats:
- 1.2.2.1 Collision risk to volant species (birds, bats and invertebrates).

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:
- 1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.3.1.2 Loss, alteration and/or degradation of habitat.
- 1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.2 Small-holder Farming (Avg. Score: 1.00)

NJ Specific Threats: 2.1.2.2 Fragments terrestrial and aquatic habitats.

2.1.3 Agro-industry (Avg. Score: 2.00)

NJ Specific Threats: 2.1.3.2 Fragments terrestrial and aquatic habitats.

2.2 Wood and Pulp Plantations

2.2.1 Small Holder (Avg. Score: 1.00)

NJ Specific Threats: 2.2.1.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.2.1.2 Tree harvesting can cause direct mortality to wildlife, especially if done during peak activity periods or vulnerable life stages (e.g., denning, nesting, gestation/birthing, basking, roosting, pre-volancy, etc.).

2.2.2 Agro-industry Plantations (Avg. Score: 2.00)

NJ Specific Threats: 2.2.2.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.2.2.2 Tree harvesting can cause direct mortality to wildlife, especially if done during peak activity periods or vulnerable life stages (e.g., denning, nesting, gestation/birthing, basking, roosting, pre-volancy, etc.).

2.3 Livestock Farming and Ranching

2.3.2 Small-holder Grazing (Avg. Score: 1.00)

NJ Specific Threats: 2.3.2.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.3 Agro-industry Grazing (Avg. Score: 2.00)

NJ Specific Threats: 2.3.3.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

3 Energy Production and Mining

3.1 Oil and Gas Facilities and Pipelines

3.1.1 Distribution processes of petroleum and other liquid hydrocarbons (Avg. Score: 2.00)

NJ Specific Threats: 3.1.1.1 Fragments terrestrial and aquatic habitats.

3.1.1.2 Loss, alteration and/or degradation of habitat.

3.1.1.3 Increased risk of oil spills.

3.1.1.4 Increased noise pollution.

3.1.1.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.

3.1.2 Natural gas distribution processes (Avg. Score: 2.00)

NJ Specific Threats: 3.1.2.1 Fragments terrestrial and aquatic habitats.

3.1.2.2 Loss, alteration and/or degradation of habitat.

3.1.2.3 Increased risk of gas leaks and explosions.

3.1.2.4 Increased noise pollution.

3.1.2.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.

3.2 Mining and Quarrying

3.2.2 Surface Mining - Rock Quarry (and sand quarries) (Avg. Score: 2.00)

NJ Specific Threats: 3.2.2.1 Fragments terrestrial and aquatic habitats.

3.2.2.2 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

3.2.2.3 Increased risk of vehicle strikes/mortality to wildlife.

3.3 Renewable Energy

3.3.1 Wind Power (Avg. Score: 2.00)

NJ Specific Threats: 3.3.1.1 Turbines, blades, and structure foundations create a collision risk to volant species (birds, bats and invertebrates) and marine animals.

3.3.1.2 Fragments terrestrial habitats.

3.3.1.3 Loss, alteration and/or degradation of habitat.

3.3.2 Solar Power (Avg. Score: 2.00)

NJ Specific Threats: 3.3.2.1 Fragments terrestrial habitats.

3.3.2.2 Loss, alteration and/or degradation of habitat.

3.4 Conventional Power Plants

3.4.0 Conventional Power Plants (Avg. Score: 1.00)

NJ Specific Threats: 3.4.0.2 Loss, alteration and/or degradation of habitat due to new or the expansion of current facilities.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats: 4.1.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species and inhibiting dispersal of non-volant animals, reducing gene flow.

4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.1.1.4 Re-establishment of abandoned railroad lines may increase the risk of direct mortality on wildlife.

4.1.2 Movement of cars and other vehicles on roads and railroads (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats: 4.1.2.1 Increased vehicle traffic increases the risk of wildlife mortality from strikes.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads (Avg. Score: 1.40)

NJ Specific Threats: 4.2.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species, inhibiting dispersal of non-volant animals, reducing gene flow, and creating barriers to fish when service line-associated roads cross streams (e.g., bridges, culverts, fords, etc.).

4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

4.2.1.5 Tall radio and utility towers with guy lines pose a strike hazard for migrant bats and birds, especially in poor visibility conditions (e.g., fog, nighttime, poor weather conditions).

4.2.2 Management of rights-of-way or communication tower facilities and/or their associated access roads (Avg. Score: 1.00)

NJ Specific Threats: 4.2.2.1 Improper or poorly scheduled vegetation management can cause direct mortality to and may reduce productivity of wildlife.

4.4 Flight Paths

4.4.1 Airplane flight paths (Avg. Score: 1.00)

NJ Specific Threats: 4.4.1.2 Increased risk of collision between airplanes and birds, bats and insects.

5 Biological Resource Use

5.1 Hunting and Collecting Terrestrial Animals

5.1.2 Unintentional effects (Avg. Score: 1.00)

NJ Specific Threats: 5.1.2.2 Disruption of normal wildlife behavior.

5.2 Gathering Terrestrial Plants

5.2.2 Unintentional effects (Avg. Score: 0.20)

NJ Specific Threats: 5.2.2.1 Stepping on nests or young/hatchling animals.

5.2.3 Control (Avg. Score: 0.60)

NJ Specific Threats: 5.2.3.2 Clearing of scrub-shrub vegetation [and snags] diminishes cover and nesting habitat.

5.3 Logging and Wood Harvesting

5.3.1 Intentional Use (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats:

5.3.1.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.1.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.1.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.1.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.1.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.1.6 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices in Atlantic White Cedar stands may destroy a unique wildlife wetland habitat that is difficult, and takes time, to restore.

5.3.2 Intentional Use (large scale) (Avg. Score: 2.00)

NJ Specific Threats:

5.3.2.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.2.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.2.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.2.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.2.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.2.6 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices in Atlantic White Cedar stands may destroy a unique wildlife wetland habitat that is difficult, and takes time, to restore.

5.3.3 Unintentional effects (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.3.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4 Unintentional effects (large scale) (Avg. Score: 3.00)

NJ Specific Threats: 5.3.4.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4.2 Extensive infrastructure and larger equipment requirements present a potential risk of direct injury/mortality to wildlife.

5.3.4.4 Infrastructure and/or equipment use may result in subtle changes to drainage patterns, adversely affecting vernal pool and wetland hydrology.

5.3.4.5 Lack of appropriate, sustainable forest management can lead to a decrease in forest habitat diversity, degraded habitat for many forest species, the loss of habitat for early-successional species, and/or the loss of unique habitats for species that need canopy breaks and multi-aged tree composition to fulfill various life history requirements.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized) (Avg. Score: 2.00)

NJ Specific Threats: 6.1.1.1 Inappropriate use of off-road vehicles creates new roads/trails which fragments habitat.

6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.

6.1.1.3 Increased risk of harassment that results in a change in wildlife behavior and/or direct mortality from vehicle strikes.

6.1.1.4 Increased noise pollution.

6.1.1.6 Off-road vehicles can be a mechanism of transference of wildlife diseases and invasive plant species if gear and apparel are not properly sanitized between sites.

6.1.5 Wildlife observation and photography (Avg. Score: 1.00)

NJ Specific Threats: 6.1.5.1 Improperly conducted recreational activities may disrupt normal wildlife behaviors which can result in reduced reproductive success or survival, abandonment of critical sites, etc.

6.1.5.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.1.7 Other (Avg. Score: 1.00)

NJ Specific Threats: 6.1.7.1 Use of recreational or commercial pyrotechnics may cause temporary disturbance to wildlife, in particular to nesting birds.

6.1.7.3 Drone use in areas with sensitive wildlife (e.g., nesting and foraging birds, migrating and foraging/feeding whales) can alter their behavior and can cause disturbance that impacts their reproductive and/or foraging success.

6.2 Military Exercises

6.2.1 Military exercises (Avg. Score: 1.00)

NJ Specific Threats: 6.2.1.1 Military testing and training exercises may inflict disturbance and potential physical harm to wildlife.

6.2.1.3 Lack of opportunity for non-federal wildlife managers to influence activities on military bases may result in detrimental impacts to SGCN and/or missed opportunities to engage in projects that benefit SGCN.

6.3 Work and Other Activities

6.3.1 Unauthorized research projects at significant habitats (Avg. Score: 1.00)

NJ Specific Threats:
6.3.1.1 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.1.2 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.1.3 Activities conducted without proper precautions may disturb and disrupt normal wildlife behaviors, which may impact reproductive success or survival, cause abandonment of critical sites, etc.

6.3.2 Authorized research projects at significant habitats (Avg. Score: 1.00)

NJ Specific Threats:
6.3.2.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.2.3 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.2.4 Activities conducted without proper precautions may disturb and disrupt normal wildlife behaviors, which may impact reproductive success or survival, cause abandonment of critical sites, etc.

6.3.3 Other "work" unrelated to research (Avg. Score: 1.00)

NJ Specific Threats:
6.3.3.4 Workers may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

7 Natural Systems Modifications

7.1 Fire and Fire Suppression

7.1.1 Increase in Fire Frequency/Intensity (Avg. Score: 1.00)

NJ Specific Threats:
7.1.1.1 Increase in frequency and intensity of wild fires as a result of droughts and heat waves drying out vegetation and litter.

7.1.1.2 Increase in frequency of wild fires as a result of illegal activities.

7.1.1.3 Unnatural fire regimes occurring as a result of military exercises.

7.1.2 Suppression of Fire Frequency/Intensity (Avg. Score: 3.00)

NJ Specific Threats:
7.1.2.1 Shift in vegetative communities as a result of suppression of natural fires.

7.1.2.2 Lack of diversity in age structure and composition of vegetation due to the suppression of fire.

7.2 Dams and Water Management/Use

7.2.1 Abstraction of Surface Water (domestic use) (Avg. Score: 1.00)

NJ Specific Threats:
7.2.1.5 Abstraction of surface water may deplete upland mesic habitats of water needed by plants and wildlife.

7.2.2 Abstraction of Surface Water (commercial use) (Avg. Score: 1.00)

NJ Specific Threats:
7.2.2.5 Abstraction of surface water may deplete upland mesic habitats of water needed by plants and wildlife.

7.2.3 Abstraction of Surface Water (agricultural use) (Avg. Score: 1.00)

NJ Specific Threats:
7.2.3.6 Abstraction of surface water may deplete upland mesic habitats of water needed by plants and wildlife.

7.2.5 Abstraction of Ground Water (domestic use) (Avg. Score: 2.00)

NJ Specific Threats: 7.2.5.2 Abstraction of ground water may deplete upland mesic habitats of water needed by plants and wildlife.

7.2.6 Abstraction of Ground Water (commercial use) (Avg. Score: 2.00)

NJ Specific Threats: 7.2.6.2 Abstraction of ground water may deplete upland mesic habitats of water needed by plants and wildlife.

7.2.7 Abstraction of Ground Water (agricultural use) (Avg. Score: 1.00)

NJ Specific Threats: 7.2.7.2 Abstraction of ground water may deplete upland mesic habitats of water needed by plants and wildlife.

7.2.13 Stream Burial (Avg. Score: 2.00)

NJ Specific Threats: 7.2.13.1 Eliminates riparian habitats.

7.2.13.2 Eliminates in-stream habitat and water resources for wildlife.

7.3 Other Ecosystem Modifications

7.3.2 Inappropriate timing of mowing (Avg. Score: 0.40)

NJ Specific Threats: 7.3.2.1 Increased risk of direct mortality and/or reduced productivity of wildlife, as well as reduced use by migrating species.

7.3.3 Removal of coarse woody debris (streams, forests, scrub-shrub habitats) (Avg. Score: 1.80)

NJ Specific Threats: 7.3.3.3 Removal of dead trees (snags), large felled logs (i.e., those > 12" dbh), and other downed woody material diminishes nesting, roosting, and sheltering options for wildlife, and increases the ease at which deer can browse regenerating vegetation.

7.3.4 Lack of natural disturbance patterns or ecosystem functions due to species loss (Avg. Score: 2.00)

NJ Specific Threats: 7.3.4.1 The management and/or loss of beavers decreases natural disturbance patterns.

7.3.4.2 The loss of top-tier predators results in an overabundance of prey species which alter or degrade the natural function of the ecological system.

7.3.4.5 The lack of forest disturbance minimizes the diversity of herbaceous vegetation and other shrubs and trees that need a lot of sunlight to grow.

7.3.5 Poor habitat management (Avg. Score: 3.00)

NJ Specific Threats: 7.3.5.1 Improper or poorly scheduled maintenance of man-made corridors (e.g., roadsides and medians) can cause direct mortality to and may reduce productivity of wildlife.

7.3.5.5 Habitat management that alters or removes vegetation without implementing long-term management increases the risk of invasive and exotic plants establishing themselves, outcompeting native vegetation.

7.3.5.6 Habitat management, including that which occurs on public and private lands, that does not consider timing and species' behaviors can result in the direct mortality and/or alteration or loss of habitat.

7.3.5.10 Ditching, draining and filling of marshes and wetlands eliminates habitat and degrades the remaining surrounding areas for wildlife.

7.3.5.12 Lack of diversity in age structure and composition of vegetation due to lack of natural disturbances and/or vegetation management.

7.3.5.14 Intentional felling and removal of dead standing trees or snags eliminates resting, nesting or feeding habitat, and precludes the snags eventual contribution to coarse woody debris and forest floor structure and habitat.

7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

7.3.5.17 Decreased diversity in height and species of herbaceous vegetation resulting in reduced cover and food for nesting and foraging wildlife.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species (Avg. Score: 2.00)

NJ Specific Threats:

8.1.1.1 Displace or outcompete native species for resources.

8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.

8.1.1.3 Invasive, non-native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

8.1.1.4 Invasive, non-native animals increase the risk of predation on native animals and/or herbivory on native vegetation.

8.1.1.5 Invasive, non-native animals and plants increase the risk of introduction and transference of diseases

8.1.4 Invasive non-native terrestrial/wetland animals (Avg. Score: 1.60)

NJ Specific Threats:

8.1.4.1 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.4.2 Free-roaming and feral domestic animals such as cats and dogs causes direct mortality of wildlife and disturbance to wildlife breeding and resting areas.

8.1.5 Invasive non-native terrestrial/wetland plants (Avg. Score: 2.40)

NJ Specific Threats:

8.1.5.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.2 Problematic Native Species/Diseases

8.2.1 Unspecified Species (Avg. Score: 2.00)

NJ Specific Threats:

8.2.1.1 Overabundant native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

8.2.1.2 Invasive pathogens and insects may increase in range and abundance as limiting factors (such as temperature) are altered as a result of climate change.

8.2.1.4 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.2.2 Named Species (Avg. Score: 2.00)

NJ Specific Threats:

8.2.2.2 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.5 Viral/Prion-induced Diseases

8.5.2 Named Species (Disease) (Avg. Score: 1.00)

NJ Specific Threats:

8.5.2.1 Diseases such as West Nile Virus, arenavirus, sudden oak death, Avian Influenza, and snake fungal disease cause morbidity or mortality to native populations.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.1 Domestic and Urban Waste Water

9.1.1 Sewage (Avg. Score: 1.00)

NJ Specific Threats: 9.1.1.3 Contaminants in sewage treatment effluents and Combined Sewer Overflows can cause developmental and behavioral abnormalities and reproductive failure in wildlife.

9.1.2 Run-off (Avg. Score: 1.00)

NJ Specific Threats: 9.1.2.3 Contaminants from road runoff (oil, sediment, salt, etc.) impact native vegetation and the species that rely upon them, degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2 Industrial and Military Effluents

9.2.1 Oil Spills (Avg. Score: 1.00)

NJ Specific Threats: 9.2.1.1 Oil spills render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.1.2 Oil spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.3 Other (Avg. Score: 1.00)

NJ Specific Threats: 9.2.3.1 Point and nonpoint source pollution such as polychlorinated biphenyls (PCBs), pesticides, heavy metals, and endocrine disrupting compounds (EDC's) into freshwater and marine systems pose threats to wildlife through direct contact and/or ingestion, and to aquatic species and their predators through bioaccumulation, impacting the reproductive success and neurological function of many avian and fish species.

9.2.3.2 Chemical spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.3.3 Chemical spills may render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.4 Other: Hydrofracturing (Avg. Score: 1.00)

NJ Specific Threats: 9.2.4.1 Contaminants from hydrofracturing degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2.4.2 Uncontrolled effluents escaping from hydrofracturing facilities can cause injury to wildlife and alter normal behaviors.

9.3 Agricultural and Forestry Effluents

9.3.3 Herbicides and Pesticides (Avg. Score: 1.00)

NJ Specific Threats: 9.3.3.3 Use of pesticides can directly harm non-target species through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture (Avg. Score: 1.00)

NJ Specific Threats: 9.3.5.3 Use of pesticides and herbicides can minimize the abundance of invertebrates needed as a food source for many birds.

9.3.5.4 Improper use of current insecticides, such as those containing esfenvalerate, prallethrin, or piperonyl butoxide, or past use of pesticides containing chlordane still present in the soils, are toxic to various wildlife species, and can cause injury, mortality, or other effects that impair population viability.

9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.5 Air-Bourne Pollutants

9.5.1 Acid Rain (Avg. Score: 2.00)

NJ Specific Threats: 9.5.1.1 Causes acidification of water bodies, resulting in changes to aquatic and marine communities and reducing biodiversity, and creating conditions that are unsuitable for some aquatic (freshwater and marine) and semi-aquatic species that are sensitive to pH shifts.

9.5.1.2 Leaches calcium from the soils which in turn reduces the availability of prey, particularly calcium-rich prey such as snails.

9.5.2 Smog (Avg. Score: 1.00)

NJ Specific Threats: 9.5.2.1 Fine airborne particulate pollutants (such as smoke from controlled burns, soil particles from plowing arid soil, etc.) can adversely affect low mobility wildlife species, including avian species during nesting.

9.5.6 Herbicides and Pesticides (Avg. Score: 2.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

9.6 Excess Energy

9.6.1 Light Pollution (Avg. Score: 2.00)

NJ Specific Threats: 9.6.1.1 Artificial lighting can reduce suitability of adjacent habitat for species sensitive to artificial lights by disorienting wildlife, reducing foraging suitability or success, or increasing visibility to predators, resulting in reduced diversity and/or productivity of species in adjacent habitat.

9.6.3 Noise Pollution (Avg. Score: 1.00)

NJ Specific Threats: 9.6.3.1 Acute and chronic noise pollution in and adjacent to terrestrial and aquatic (marine and freshwater) environments could disrupt normal behaviors of wildlife such as migration, communication, feeding, eluding predators, resting and breeding, etc.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 1.20)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.2 Droughts

11.2.1 Droughts (Avg. Score: 2.00)

NJ Specific Threats: 11.2.1.1 Contribute to hardened soils, decreasing water recharge during rains and increasing the likelihood of flash floods during storms.

11.2.1.2 Lead to lower groundwater levels and therefore, less available water for people and habitats.

11.2.1.3 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

11.3 Temperature Extremes

11.3.1 Temperature extremes (Avg. Score: 2.00)

NJ Specific Threats: 11.3.1.1 Increasing temperatures may cause habitat loss and degradation by desiccating and/or raising the temperatures of small wetlands and streams leading to the loss of freshwater mussels and other aquatic species and species reliant upon these habitats.

11.3.1.2 Increased temperatures can negatively impact wetland, riverine, lacustrine and vernal pool-associated or -dependent wildlife by reducing flows, increasing water temperatures, lowering water levels and causing premature drying of vernal habitats.

11.4 Storms and Flooding

11.4.1 Storms and flooding (Avg. Score: 1.20)

NJ Specific Threats: 11.4.1.5 Storm damage can alter forest structure via blow-downs or micro-bursts, and can destroy bird nesting in the locales where the storms occur.

11.4.1.6 Increased storms and flooding reduce nesting success, especially for ground-nesting birds.

11.4.2 Increased rainfall (Avg. Score: 1.20)

NJ Specific Threats: 11.4.2.2 Extreme rain events can damage wildlife nesting and resting habitats, including impacts to avian eggs and chick and small mammal survivorship.

11.4.2.3 More frequent rain events can alter terrestrial and wetland vegetation communities as well as wetland hydrology, shifting wildlife community use.

11.6 Phenology Shifting or Alteration

11.6.2 Phenology shifts related to predator-prey ecology (Avg. Score: 2.00)

NJ Specific Threats: 11.6.2.1 Alters inter-specific relationships (e.g., competition, parasitism, predation) of wildlife, ultimately leads to detrimental impacts on the ecological system.

11.6.2.2 Shifts timing of species migration, breeding and hibernation, and available food resources, causes redistribution of species, or mortality for species that are unable to relocate due to their already isolated habitat or limited mobility.

11.6.3 Phenology shifts related to species redistribution (Avg. Score: 1.00)

NJ Specific Threats: 11.6.3.1 Shifts in timing of species migration, breeding and hibernation, and available food resources, as a result of wildlife range shifts driven by climate change.

11.6.3.2 Shifts in nesting times or egg incubation durations can limit nest success and longterm populations.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 1.00)

NJ Specific Threats: 12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.6 Lack of information regarding migratory pathways and response of wildlife to lights and noise associated with offshore wind turbines.

12.1.2 Lack of up-to-date existing information (Avg. Score: 1.60)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.2.2 Lack of wildlife monitoring at sites with structures that pose high risk of mortality to SGCN wildlife.

12.1.3 Need to answer research question (Avg. Score: 1.20)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.3.4 Lack of information regarding the potential short- and long-term impacts of wind turbines and other tall coastal structures on migratory populations.

12.1.4 Need to develop new technique (Avg. Score: 1.00)

NJ Specific Threats: 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.

12.1.4.2 Improve and evaluate survey methods for species not easily detected through standard survey methods.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 2.00)

NJ Specific Threats:

12.3.0.1 Regulatory habitat protections within state land use regulations are spatially limited to specific geographic areas (e.g., Pinelands, Coastal Area) or geographic features (e.g., wetlands, streams) and so fail to protect critical habitats that exist outside of these regulated areas.

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.9 Prescribed burns implemented by the NJ Forest Fire Service are constrained by State air quality regulations to a timeframe where seasonal weather conditions are less than ideal for effective burning. As a result, the Forest Fire Service is limited in the number of overall prescribed burns it can implement to restore habitat for wildlife.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 2.00)

NJ Specific Threats:

12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.

12.4.0.5 Bureau of Forest Fire Management policy has traditionally implemented prescribed burns on State lands for the sole purpose of public safety (i.e., addressing hazard fuel reduction), missing opportunities to burn in a manner that would additionally manage habitat for ecological diversity.

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 2.00)

NJ Specific Threats:

14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 2.60)

NJ Specific Threats:

14.2.1.1 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various forest management practices.

14.2.1.5 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various wetland management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 2.00)

NJ Specific Threats: 15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.1 Enhance critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates through incentive programs with adjacent private landowners to increase the effective size of the habitat.

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.3 Secure and promote the protection/restoration of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through incentive programs.

1.2.1.5 Secure and promote the protection/restoration of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through incentive programs.

1.2.1.6 Secure and promote the protection/restoration of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.9 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing Forestry Stewardship Programs.

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.12 Create incentives (non-monetary and/or monetary) for land developers to redevelop abandoned areas (e.g., shopping centers, office complexes) to minimize the loss of natural habitats and reduce the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.14 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of herbicides and pesticides, and implementing more ecologically safe strategies when using such products.

1.2.1.16 Create incentives (non-monetary and/or monetary) within State regulations (mitigations requirements or credit, BMP satisfaction, etc.) to promote the use of retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.17 Develop a public-relations oriented certification program for private retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.18 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and land managers to control and reduce the impacts of invasive, native and non-native species in order to increase structural habitat diversity.

1.2.1.19 Create incentives for federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to farmers, woodland landowners, and private landowners to adopt and/or endorse consistent BMPs concerning controlled burns to maintain and/or improve wildlife habitat.

1.2.1.20 Coordinate across government agencies and non-government organizations to create or expand upon tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMP's.

1.2.1.21 Create and/or support market-based programs that subsidize or create branding for products derived sustainably from managed wildlife habitats.

1.2.1.22 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to horse/livestock farm owners and managers to increase structural habitat diversity in and around the farms by managing vegetation for a variety of species, in particular, farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

1.2.1.23 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to provide cost shares and/or plan approvals for management based on management approaches and prescriptions.

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

1.2.1.28 Create incentives to implement dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

2 Direct Management of Natural Resources

2.3 Fire management

2.3.2 Fuel reduction

2.3.2.1 Prevent wildfires by reducing natural fuel (e.g., leaf litter).

2.3.3 Prescribed burning

2.3.3.1 Evaluate different management techniques of prescribed burns that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

2.3.3.2 Conduct prescribed burning in Northern New Jersey forests to maintain and regenerate a mosaic of upland forest habitats.

2.3.3.3 Conduct prescribed burning to improve wildlife habitat.

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.1 Control invasive insect infestations by implementing BMP strategies through biological, chemical and/or mechanical means that will depress, or when appropriate, eradicate populations in a manner that avoids excessive harm to non-target species using BMPs to control infestations and limit their spread based on an inventory of invasive insect distribution and response to outbreaks.

2.8.0.2 Develop, implement, monitor and evaluate pest control/management strategies to reduce the impacts of over-abundant wildlife species (native and/or native, invasive species) on native vegetation and the degradation of habitats supporting SGCN. Over-abundant wildlife species include but are not limited to mute swans, Canada geese, beaver and white-tailed deer.

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.6 Implement long-term management of invasive and/or non-native plants to help maintain functioning ecological systems and biological diversity, and to enhance travel corridors. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.8 Protect significant natural and/or unique communities by implementing best management practices when conducting habitat restoration strategies.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.10 Minimize the loss of important habitats (e.g., coastal scrub-shrub and grassy habitats, high and low marsh habitats, etc.) that provide nesting, migrating, and wintering areas for SGCN birds and other coastal and marsh-dependent species through habitat restoration efforts.

2.10.0.11 Restore and/or enhance critical migratory terrestrial and aquatic habitats (e.g., beach, grasslands, forest, scrub-shrub, etc.) for songbirds, raptors, shorebirds, waterfowl, bats and invertebrates through habitat restoration efforts and expand habitat restoration to adjacent private lands to increase the effective size of the habitat.

2.10.0.12 Create and/or maintain scrub-shrub habitats through revegetation efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.21 Restore and/or enhance understory habitats that suppress invasive species and provide critical resources and enhance sheltering, foraging, and nesting cover for wildlife.

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.10.0.23 Restore and/or enhance roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.11.0.3 Create suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats through vegetation management.

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through vegetation management.

2.11.0.6 Reclaim degraded rare species habitats by conducting vegetation management needed to restore habitat value for the documented/target SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.8 Maintain, enhance and/or restore biologically appropriate buffers for SGCN-inhabited/used freshwater wetlands through vegetation management.

2.11.0.9 Minimize habitat loss of critical coastal habitats that provide nesting, migrating, and wintering areas for birds and other coastal species by maintaining or enhancing these areas through vegetation management.

2.11.0.12 Conduct vegetation management to create feeding and roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

2.11.0.13 Implement best management practices (BMPs), protective strategies, and guidelines for vegetation management to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.11.0.16 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.11.0.19 Implement forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN.

2.11.0.20 Create and/or maintain scrub-shrub habitats through management efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.11.0.21 Minimize the degradation, alteration and/or changes in hydrology of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and subsequent disturbances to and behavioral changes of wildlife by maintaining or enhancing these areas and biologically appropriate buffers through habitat management and/or revegetation or restoration efforts.

2.11.0.23 Implement appropriate habitat management actions in areas where natural disturbances, such as wildfire, have been precluded.

2.11.0.25 Conduct vegetation management along access roads following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.27 Conduct vegetation management for target shrub- or young forest-dependent SGCN following BMPs to minimize the risk of the establishment of invasive and non-native plants.

2.11.0.28 Conduct vegetation management in agricultural areas following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.29 Conduct vegetation management on transportation and service corridors (i.e., rights-of-way) following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.31 In areas where vegetative communities are shifting due to fire suppression and controlled burns are not feasible, manage vegetation to improve wildlife habitat.

2.11.0.32 Increase structural habitat diversity around and when feasible, within agricultural landscapes by managing vegetation for a variety of species, in particular, those farms that have removed scrub-shrub habitat and/or fragmented forests, and by implementing ecologically best practices (e.g., no-till farming, maintaining hedgerows, buffer set-asides, etc.).

2.11.0.33 Increase structural habitat diversity by implementing long-term vegetation management to minimize the potential for the establishment of invasive and/or non-native plants that may outcompete native vegetation.

2.11.0.34 Increase structural habitat diversity by managing residential, commercial and recreational areas' landscapes for a variety of species. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.

2.11.0.37 Increase structural habitat diversity by minimizing the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats which benefits wildlife.

2.11.0.38 Increase structural habitat diversity in and around horse/livestock farms by managing vegetation for a variety of species, in particular, in and around farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

2.11.0.39 Increase structural habitat diversity in and around solar farms by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.40 Increase structural habitat diversity surrounding areas used for energy, mining, and transportation and service corridors by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides, and avoid managing habitat during the breeding seasons for ground-nesting birds, reptiles, amphibians and small mammals.

2.11.0.41 Increase structural habitat diversity through the implementation of a variety of vegetation management practices such a prescribed burns (either increasing or decreasing their frequency depending on the site and objective), plantings, etc. that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.42 Increase structural habitat diversity within wind farms for terrestrial bound and low-flying species and around wind farms for other wildlife by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.43 Manage forests to increase variation in age structure and composition using BMPs that promote and maintain functioning ecological forest-based systems and biological diversity.

2.11.0.45 Regularly and/or rotationally create young forest habitat in targeted areas to maintain and regenerate a mosaic of upland forest habitats that will benefit shrub- and young forest-dependent species.

2.13 Wildlife damage management

2.13.0 Nuisance fish and wildlife damage

2.13.0.5 Investigate the impacts of human-subsidized and/or naturally occurring predator species on SGCN to assess the need for integrated wildlife damage management techniques (e.g., predator exclosures, fish blockages, electric fence, culls) and/or policy changes on state land management that minimize the impacts of human-subsidized predators.

2.13.0.7 Develop, implement, monitor and evaluate management strategies to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

2.13.0.8 Implement and assess management strategies to control and reduce the impacts of detrimental species and diseases that pose threats to native wildlife or communities.

2.14 Wildlife disease management

2.14.0 Wildlife disease strategy development and investigation

2.14.0.1 Investigate diseases/pathogens impacting SGCN and/or their habitats.

2.14.0.2 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.6 Conduct long-term studies on resident and migratory SGCN to determine if there are changes to the populations' demography (productivity, survival, dispersal) and/or to their critical and/or supporting habitats (i.e., diminishing in value, acreage or connectivity, etc.), in particular changes that would not maintain SGCN at viable levels for species populations. Update data and GIS maps; provide updated information to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.9 Identify SGCN (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources, and compile/collect and evaluate data/information regarding potential management strategies to improve the availability of such SGCN's food resources.

3.0.0.10 Conduct long-term studies to evaluate the effectiveness of management strategies implemented to enhance food/prey availability for SGCN [whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources] through studies that investigate the populations and health of the food resources as well as the target SGCN. Revise management strategies as needed and continue to monitor the effectiveness of the efforts.

3.0.0.11 Develop, implement and evaluate the effectiveness of town plans that avoid impacts to SGCN species and their habitats.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.25 Identify pathways of migratory SGCN in the Atlantic Coastal and Marine Regions (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and use the data to help evaluate the potential short- and long-term impacts of wind turbines, radio towers, utility guy lines, and other tall coastal structures on migratory populations.

3.0.0.26 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species including objectives and guidance pertaining to and the condition/status of critical and supporting habitats.

3.0.0.30 Conduct research to investigate the feasibility of managing and/or creating roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

3.0.0.31 Conduct short- and long-term studies (e.g., wildlife surveys and habitat assessments) to evaluate the effectiveness of vegetation management efforts to maintain, enhance and/or create roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.2 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.0.5 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

3.2.0.10 Evaluate the effectiveness of sanitation/decontamination protocols in minimizing the transference of wildlife diseases and invasive plant species.

3.2.0.11 Investigate the impacts of ORV use as a mechanism to spread wildlife diseases and invasive plant species to native wildlife and habitats. Integrate this information when mapping undeveloped roads and trails to identify potentially sensitive areas in northern NJ forests.

3.2.0.17 Conduct monitoring at constructed wind farms (within or outside of NJ) to assess the impacts on migratory species (birds, bats, insects) and determine if NJ's land use planning efforts and/or smart-growth plans need to be revised.

3.2.0.24 Develop, implement and evaluate the effectiveness of BMPs for lighting of/on tall structures that minimize harm to and/or disorient wildlife, in particular but not limited to migratory birds, bats and invertebrates. Implement BMPs into state, county and local permitting processes.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.2 Age, size and sex structure

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.7 Map and prioritize existing and potential areas for early succession forest management. Share the results with state, county and municipal planners.

3.3.1.8 Assess the availability and suitability of forest habitats for SGCN species (particularly reptiles and amphibians, birds, pollinators, and tiger beetles) in southern forests since Superstorm Sandy.

3.3.1.9 Inventory forests throughout northern New Jersey to develop a baseline characterization of the structure and composition of habitats and identify deficient forest habitat types.

3.3.1.18 Conduct an assessment using available data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels.

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.2 Monitoring

3.3.2.1 Evaluate the effectiveness of forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.8 Evaluate the effectiveness of current prescribed burning practices on Pinelands dependent species.

3.3.2.9 Investigate the effectiveness of various silviculture techniques for enhancing forests for forest-dependent SGCN.

3.3.2.10 Evaluate the efficacy and success of different management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.3.2.15 Investigate the effectiveness of management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.3.2.20 Once a system is developed for reporting and qualifying new locations of invasive species, develop, implement and monitor/evaluate invasive species removal strategies at identified locations. Priority should be given to those areas critical to SGCN and/or contain unique and/or rare plant communities supporting SGCN and/or other fish/wildlife species.

3.3.2.24 Conduct regular inventories of forests throughout northern New Jersey to characterize the changing structure and composition of habitats and monitor forest conditions.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.3 Develop/improve management techniques that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.7 Develop/improve forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

3.5.3.8 Develop best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5.3.9 Develop strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.3.19 Work with foresters to develop prescribed burning practices for Pinelands dependent species that increase or maintain habitat quality for these species in the Pinelands.

3.5.3.20 Develop guidance on various silviculture techniques for enhancing forests for forest-dependent SGCN.

3.5.3.21 Develop management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.24 Based on research, modify management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.2 Develop, implement, monitor and evaluate management strategies to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

3.5.4.10 Develop BMPs for lighting of/on tall structures that minimize harm to and/or disorientation of wildlife, in particular but not limited to migratory birds, bats and invertebrates.

3.5.4.14 Develop and implement agreements, and update existing agreements, with government agencies regarding the protection of critical SGCN habitats (e.g., significant breeding populations of beach nesting birds, colonial waterbird nesting areas, bat colonies, etc.).

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.17 Investigate new, non-invasive techniques for SGCN population evaluation through literature review, expert opinion, trial studies (if low risk), etc.

3.5.4.18 Investigate the effectiveness of survey techniques through selected “ground truthing” and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

4 Education

4.1 Educator/Instructor training

4.1.0 Public education

4.1.0.1 Provide educational resources and training programs to private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

5 Facilities and Areas

5.15 Wildlife Management Areas

5.15.6 Roads

5.15.6.1 Clearly post areas/roads where vehicle access is permitted.

5.15.6.2 Clearly post areas/trails where vehicle access is not permitted.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.1 Enhance and increase the effective size of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates by securing adjacent habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.3 Secure and protect riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.5 Secure and protect critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.7 Secure and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.8 Secure and protect scrub-shrub habitats for SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.1 Promote the protection of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates and enhance these lands by increasing the effective size through conservation area designations of stopover habitats and adjacent private lands.

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.3 Increase the protection of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through conservation area designations.

6.3.0.5 Promote the protection of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through conservation area designations.

6.3.0.7 Promote the protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through conservation area designations.

6.3.0.8 Promote the protection of scrub-shrub habitats for SGCN through conservation area designations.

6.4 Private lands agreements

6.4.0 Private land agreement strategies

6.4.0.1 Enter into private lands agreements to expand control burns on private lands, in particular those adjacent to conserved lands to improve SGCN habitats.

7 Law Enforcement

7.1 Law enforcement

7.1.4 Scale Unspecified

7.1.4.1 Improve enforcement of policies and/or regulations that promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

7.1.4.4 Improve enforcement of policies/regulations aimed at protecting and preserving critical coastal and marsh habitats, and secure mitigation for losses that create an environmental benefit.

7.1.4.5 Enforce current policies and/or regulations to increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal SGCN, and implement and enforce amended policies/regulations.

7.1.4.7 Increase law enforcement presence to enforce regulations governing recreational activities (e.g., the use of personal watercraft and off road vehicles, caving, rock climbing, etc.) on conserved lands and within other sensitive habitats, and discourage activities that cause harm or disturbance to vegetation, wetlands, fish and wildlife.

7.1.4.8 Implement policies that protect critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates.

7.1.4.10 Implement policies that promotes expanding acreages and enhances the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

7.1.4.11 Implement and enforce policies/regulations that will increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.15 Implement policies that preserve and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

7.1.4.16 Implement policies that protect and restore riparian areas.

7.1.4.17 Improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

7.1.4.19 Implement policies that protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

7.1.4.21 Implement regulations for lighting of/on tall structures that will minimize harm to and/or disorientation of wildlife, and enforce within state, county and local permitting processes.

7.1.4.22 Implement policies and/or regulations that prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

7.1.4.25 Encourage the enforcement of municipal laws regulating domestic pets that may predate on wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.4 Engage government agencies, conservation partners and other stakeholders in constructive dialogues encouraging them to influence policy change and the creation of incentives through a habitat bill and/or municipal ordinances for backyard habitat.

8.1.0.13 Engage DOD in a constructive dialogue regarding strategies to minimize disturbances to all SGCN (i.e., beyond their federal requirements) from forest management and other practices on their lands.

8.1.0.16 Engage local governments in discussions regarding the importance of them adopting/passing ordinances which require assessing and addressing secondary impacts (i.e., ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

8.1.0.17 Engage municipalities in constructive dialogue to identify and minimize destruction of areas prioritized for early succession forest management.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.21 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation human-subsidized and/or overabundant, native species cause to local nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.22 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation invasive species cause to native nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.26 Coordinate across federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to woodland landowners to adopt or endorse consistent best management practices concerning controlled burns to maintain and/or improve forested habitat for wildlife.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.33 Engage government agencies, conservation partners and other land managers, communities, landowners, and commercial and industrial stakeholders in discussions regarding the importance of protecting and methods to protect priority wetlands beyond the levels afforded through regulation by maintaining and/or restoring optimal biological buffers around wetlands.

8.1.0.37 Enlist landowners and NJ citizens in the protection of and survey efforts for SGCN, in particular rare species, by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management and wildlife-related volunteer programs.

8.1.0.38 Engage partners, stakeholders and land managers in constructive dialogue promoting forest stewardship for SGCN that use core forests and forested corridors.

8.1.0.44 Engage conservation partners, stakeholders, government agencies and other land stewards in constructive dialogues encouraging their inclusion of controlled burns in forest and other stewardship plans.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.1.0.48 Form cooperative partnerships with transportation and shipment agencies and companies to facilitate habitat creation and enhancement away from and outside of project areas and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.2 Recruitment and retention activities

8.2.3 For wildlife watching

8.2.3.1 Develop and implement nature-focused tourism opportunities including wildlife viewing sites, interpretive signage highlighting unique ecosystems/habitats, and wildlife-related recreational opportunities that do not negatively impact SGCN or their habitats.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.5 Develop and provide (or otherwise make publicly available) educational programs and/or materials that provide homeowners information on how to design dwellings and other structures in a manner that is wildlife friendly (e.g., using bird-safe glass on windows).

8.3.0.6 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners, land managers and local communities to discourage the presence of managed cat colonies and trap, neuter and release programs in wildlife habitats.

8.3.0.9 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners and land managers to include only native plants in landscaping and restoration projects. Provide information to assist them in detecting problematic establishment of invasive, non-indigenous plants.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.19 Develop an educational outreach program for the public on the devastating effects predators can have on native nesting wildlife.

8.3.0.25 Develop educational outreach programs for landowners, nurseries and the general public regarding the negative impacts of invasive and non-native plants on our natural communities.

8.3.0.26 Develop educational outreach programs for private and public landowners and land managers regarding the importance of and how to manage core forests and forested corridors in a way that will be beneficial for SGCN, particularly endangered, threatened and special concern species.

8.3.0.27 Develop educational outreach programs for public and private landowners and land managers regarding the importance of structural habitat diversity, methods to increase diversity, and/or incentive programs available to increase habitat diversity.

8.3.0.30 Develop educational outreach programs for private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.5 Develop a plan that directs the creation or expansion of energy or utility rights-of-way in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.6 Develop a plan that directs the creation or expansion of roads and railroads or the re-establishment of abandoned railroads within and adjacent to critical forested habitats in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.7 Develop a plan that directs the maintenance of or new channelization of forested streams and rivers in a manner that minimizes impacts of the aquatic ecological system and adjacent forest

9.1.0.9 Develop a plan that focuses on strategies to minimize the creation of renewable energy farms (e.g., solar, wind) and related infrastructures within and their impacts on forested habitats and the wildlife community.

9.1.0.10 Develop a plan that focuses on strategies to minimize the impacts of mining on critical forested habitats.

9.1.0.11 Develop a plan that focuses on strategies to minimize the impacts of power plants on critical forested habitats and the wildlife community.

9.1.0.13 Develop a plan to minimize agriculture that would result in groundwater withdrawal in critical forested areas.

9.1.0.14 Develop a plan to minimize development that would result in groundwater withdrawal in critical forested areas.

9.1.0.15 Develop a plan to minimize fragmentation of terrestrial and aquatic habitats by roads.

9.1.0.16 Develop a plan to minimize new lawnscapes and preserve natural vegetation within and adjacent to critical forest areas.

9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

9.1.0.20 Develop a plan to minimize the impacts of existing agricultural properties adjacent to and the conversion of forest habitats (terrestrial and aquatic, within or adjacent to critical forests) to agriculture, grazing areas/livestock farms, and plantations.

9.1.0.21 Develop a plan to minimize the use of any-sized dam in critical forested areas.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.24 Develop a plan to prevent livestock from entering water bodies in critical forested habitats.

9.1.0.25 Develop a plan to prevent the conversion of forested stream buffers to pastures in critical forested habitats.

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.31 Develop wetland restoration plans that consider the life history and needs of wildlife occupying targeted habitats.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.7 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.16 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.2 Listed species recovery planning

9.3.2.1 Develop proactive species recovery plans for all endangered and threatened species including guidance and objectives pertaining to critical and supporting habitat to meet and maintain recovery goals.

9.3.3 Habitat management planning

9.3.3.5 Develop a management plan using forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

9.3.3.6 Develop a management plan for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

9.3.3.7 Develop a management plan to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

9.3.3.8 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.3.9 Develop a response plan to outbreaks using BMPs to control infestations and limit their spread in a way that avoids excessive harm to non-target species.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.3.13 Develop a management plan that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas and prevents or ameliorates near-term impacts of climate change throughout the State, but in particular within the coastal and Delaware Bay areas.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.17 Develop a management plan for prescribed burning that will benefit Pinelands dependent species and increase or maintain habitat quality for these species in the Pinelands.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.20 Develop an action plan for immediate implementation should habitat levels fall below the minimum necessary size and/or structure within the Cape May Peninsula to sustain the avian migration.

9.3.3.21 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.3.24 Develop a plan to improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

9.3.3.29 Develop habitat management plans aimed at reducing or eliminating negative impacts of ORVs.

9.3.3.32 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3.34 Include controlled burn prescriptions in forest and stewardship plans to improve wildlife habitat.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.3 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.10 Use CHANJ mapping in reviews of proposed energy, mining, transportation and utility service companies/agencies' projects to attempt to maintain habitat connectivity and reduce fragmentation, and identify potential impacts of the projects.

11.1.1.11 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed offshore energy projects relating to drilling, extraction and distribution of petroleum and gas products to reduce habitat destruction and minimize impacts on wildlife.

11.1.1.12 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed solar farm projects to reduce habitat fragmentation and minimize impacts on wildlife.

11.1.1.13 Use the best available science (species data, habitat present, wind farm layout options, wind blade impacts on migratory species, location of migration routes, etc.) when conducting regulatory reviews of proposed wind farm projects to minimize impacts on migratory and resident wildlife and reduce habitat fragmentation.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.2 Provide technical support to public and private landowners and land managers for controlling invasive, native and non-native plant species in order to increase structural habitat diversity.

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.7 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on the importance of maintaining habitat connectivity, minimizing fragmentation, and the use of CHANJ products to help them target areas for such planning.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.11 Provide educational resources, training programs, and on-the-ground guidance to private and public landowners and land managers on the benefits of and for creating young forest and early succession habitat for SGCN.

11.2.0.14 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters), and to enhance or restore biologically appropriate buffers.

11.2.0.16 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

11.2.0.19 Provide educational resources and technical support to public and private landowners and land managers to promote the protection and/or enhancement of scrub-shrub habitats for SGCN.

11.2.0.20 Provide educational resources and technical support to public and private landowners and land managers to promote the protection and/or enhancement of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN.

11.2.0.21 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates to promote the protection and/or enhancement of those adjacent habitats to increase the effective size of the migratory habitat.

11.2.0.22 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

11.2.0.23 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to SGCN habitats to promote the protection and/or enhancement of those adjacent habitats to increase the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and that connect conserved SGCN habitats.

11.2.0.25 Provide educational resources, training programs, and on-the-ground guidance to resource managers regarding the assessment of and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) related to residential and commercial development.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.1 Engage partners and stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.3 Provide educational resources, training programs, and on-the-ground guidance to DOD to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop and implement forest management and other practices that minimize disturbances to SGCN (i.e., beyond their federal requirements).

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

100 Law and Policy

100. Legislation

100.1.3 Sub-national Level

100.1.3.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.4 County and Local

100.1.4.1 Enhance critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates through the local ordinances of adjacent private lands to increase the effective size of the habitat.

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.3 Expand the acreages and enhance the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN through local ordinances.

100.1.4.4 Secure wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and biologically appropriate buffers through local ordinances.

100.1.4.5 Secure SGCN-inhabited/used freshwater wetlands and biologically appropriate buffers through local ordinances.

100.1.4.8 Secure critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through local ordinances.

100.1.4.10 Secure critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through local ordinances.

100.1.4.11 Secure riparian areas through local ordinances.

100.1.4.12 Secure scrub-shrub habitats for SGCN through local ordinances.

100.1.4.13 Encourage municipal laws regulating domestic pets that may predate on wildlife.

100.1.4.14 Adopt/pass local ordinances which require assessing and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.5.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100.1.5.5 Develop legislation to provide financial support for the New Jersey Invasive Species Strike Team.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.3 Develop policies that will promote the long term protection of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates.

100.3.0.5 Develop policies that will promote improved and secure habitat connections between conserved SGCN habitats.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.7 Amend current policies and/or regulations to increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.12 Develop policies that promote the preservation and protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.14 Develop policies and/or regulations that increase the protective buffers of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) to biologically appropriate distances to benefit SGCN that rely upon these habitats and improve the function of the [associated] aquatic systems.

100.3.0.15 Develop policies that promote protecting and restoring scrub-shrub habitats to benefit shrub-dependent SGCN.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.19 Develop regulations for lighting of/on tall structures that will minimize harm to and/or disorientation of wildlife, in particular but not limited to migratory birds, bats and invertebrates. Implement BMPs into state, county and local permitting processes.

100.3.0.20 Develop policies and/or regulations that prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

100.3.0.23 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.31 Create or expand tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMPs.

100.3.0.32 Coordinate regulations across agencies to maximize availability of and enrollment in existing Forestry Stewardship Programs (e.g., "Woodland Stewards", Farm Bill, partners, etc.) to maintain and/or improve forest habitat.

100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.

100.3.0.42 Fully adopt the former Storm water Management Rules' 300ft buffer requirements into the Flood Hazard Area Control Act Rules.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.45 Increase the controlled burn season to focus on restoring vegetative communities.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.48 Propose new State law or regulation mandating that a State-level "development impact fee" be assessed on all new development approved by municipalities (via the Municipal Land Use Law processes), and dedicate such monies to the development and implementation of regional Habitat Conservation Plans (or existing plans/programs serving the same regional function).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.53 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded rights-of-way corridors associated with energy transport/transmission.

100.3.0.54 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded surface mining areas.

100.3.0.56 Develop regulations that when implemented will protect critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates.

100.3.0.57 Develop regulations that when implemented will improve and secure habitat connections between conserved SGCN habitats.

100.3.0.58 Develop regulations that when implemented will promote the expansion of acreages and enhancement of the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.59 Develop regulations that when implemented will increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.63 Develop regulations that when implemented will preserve and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.64 Develop regulations that when implemented will protect and restore riparian areas.

100.3.0.65 Develop regulations that when implemented will protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

100.3.0.67 Develop regulations for lighting of/on tall structures that will minimize harm to and/or disorientation of wildlife, and enforce within state, county and local permitting processes.

100.3.0.68 Develop regulations that when implemented will prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

100.3.0.70 Develop regulations that when implemented will facilitate the restoration of dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.4 Create a policy that requires the use of wildlife habitat and corridor mapping products for both regulatory use when conducting project reviews and planning/siting new or expanded rights-of-way projects.

100.4.0.8 Develop a white paper addressing the impacts that existing, new or expanded rights-of-way have upon wildlife, wildlife habitats and habitat connectivity.

100.4.0.9 Develop and implement policies to minimize the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats in order to benefit wildlife.

100.4.0.13 Develop policies for different circumstances (e.g., roadsides and medians, riparian, aquatic and terrestrial habitats) that outline appropriate habitat/vegetation management strategies and schedules to minimize risks to and benefit wildlife.

100.4.0.16 Develop policies to implement habitat management strategies that will increase the structural diversity surrounding areas used for energy, mining, and transportation and service corridors which include but are not limited to the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-

100.4.0.17 Develop policies to implement habitat management strategies, including prescribed burns, that will increase the structural diversity on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies to control and reduce the impacts of invasive, non-native species in order to increase structural habitat diversity.

100.4.0.18 Develop policies to minimize the extent of infrastructure associated with energy and service corridors or areas (e.g., wind and solar farms, pipelines, utility lines) and that require the implementation of habitat management strategies that will increase the structural diversity in the area including (e.g., the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides).

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.24 Develop policies to provide financial support for the New Jersey Invasive Species Strike Team.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Grassland Birds

Focal species that comprise this Conservation Target:

Bobolink | Eastern Meadowlark | Grasshopper Sparrow
Vesper Sparrow

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:
- 1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.1.1.2 Loss, alteration and/or degradation of habitat.
- 1.1.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.
- 1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.1.2 Residential development using materials that cause collision hazards (Avg. Score: 2.00)

NJ Specific Threats:
- 1.1.2.1 Collision risk to volant species (birds, bats and invertebrates).

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:
- 1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.2.1.2 Loss, alteration and/or degradation of habitat.
- 1.2.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.
- 1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.2.2 Commercial development using materials that cause collision hazards (Avg. Score: 2.00)

NJ Specific Threats:
- 1.2.2.1 Collision risk to volant species (birds, bats and invertebrates).

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:
- 1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.3.1.2 Loss, alteration and/or degradation of habitat.
- 1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture (Avg. Score: 3.00)

NJ Specific Threats: 2.1.1.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.1.5 Lack of competitive market prices to maintain native grasslands causes conversion to other crops that have more monetary value but less value as wildlife habitat.

2.1.2 Small-holder Farming (Avg. Score: 2.00)

NJ Specific Threats: 2.1.2.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.2.2 Fragments terrestrial and aquatic habitats.

2.1.2.3 Agricultural practices (e.g., mechanized, row-crop agriculture) can render lands unsuitable for most wildlife due to soil degradation and erosion.

2.1.2.4 Agricultural practices (e.g., mechanized, row-crop agriculture) can cause direct mortality to wildlife when harvesting takes places.

2.1.2.5 Lack of competitive market prices to maintain native grasslands causes conversion to other crops that have more monetary value but less value as wildlife habitat.

2.1.3 Agro-industry (Avg. Score: 3.00)

NJ Specific Threats: 2.1.3.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.3.2 Fragments terrestrial and aquatic habitats.

2.1.3.3 Agricultural practices (e.g., mechanized, row-crop agriculture) can render lands unsuitable for most wildlife due to soil degradation and erosion.

2.1.3.4 Agricultural practices (e.g., mechanized, row-crop agriculture) can cause direct mortality to wildlife when harvesting takes places.

2.1.3.5 Loss of ecotones by implementing clean farming (edge-to-edge) practices degrades habitat for early successional wildlife.

2.1.3.6 Lack of competitive market prices to maintain native grasslands causes conversion to other crops that have more monetary value but less value as wildlife habitat.

2.3 Livestock Farming and Ranching

2.3.2 Small-holder Grazing (Avg. Score: 2.00)

NJ Specific Threats: 2.3.2.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.2.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

2.3.3 Agro-industry Grazing (Avg. Score: 2.00)

NJ Specific Threats: 2.3.3.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.3.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

3 Energy Production and Mining

3.1 Oil and Gas Facilities and Pipelines

3.1.1 Distribution processes of petroleum and other liquid hydrocarbons (Avg. Score: 1.00)

NJ Specific Threats: 3.1.1.1 Fragments terrestrial and aquatic habitats.

3.1.1.2 Loss, alteration and/or degradation of habitat.

3.1.1.3 Increased risk of oil spills.

3.1.1.4 Increased noise pollution.

3.1.1.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.

3.1.2 Natural gas distribution processes (Avg. Score: 1.00)

NJ Specific Threats:
- 3.1.2.1 Fragments terrestrial and aquatic habitats.
- 3.1.2.2 Loss, alteration and/or degradation of habitat.
- 3.1.2.3 Increased risk of gas leaks and explosions.
- 3.1.2.4 Increased noise pollution.
- 3.1.2.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.

3.2 Mining and Quarrying

3.2.2 Surface Mining - Rock Quarry (and sand quarries) (Avg. Score: 2.00)

NJ Specific Threats:
- 3.2.2.1 Fragments terrestrial and aquatic habitats.
- 3.2.2.2 Loss, alteration and/or degradation of terrestrial and aquatic habitats.
- 3.2.2.3 Increased risk of vehicle strikes/mortality to wildlife.

3.3 Renewable Energy

3.3.1 Wind Power (Avg. Score: 2.00)

NJ Specific Threats:
- 3.3.1.1 Turbines, blades, and structure foundations create a collision risk to volant species (birds, bats and invertebrates) and marine animals.
- 3.3.1.2 Fragments terrestrial habitats.
- 3.3.1.3 Loss, alteration and/or degradation of habitat.

3.3.2 Solar Power (Avg. Score: 2.00)

NJ Specific Threats:
- 3.3.2.1 Fragments terrestrial habitats.
- 3.3.2.2 Loss, alteration and/or degradation of habitat.

3.4 Conventional Power Plants

3.4.0 Conventional Power Plants (Avg. Score: 1.00)

NJ Specific Threats:
- 3.4.0.2 Loss, alteration and/or degradation of habitat due to new or the expansion of current facilities.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats:
- 4.1.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species and inhibiting dispersal of non-volant animals, reducing gene flow.
- 4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.
- 4.1.1.4 Re-establishment of abandoned railroad lines may increase the risk of direct mortality on wildlife.

4.1.2 Movement of cars and other vehicles on roads and railroads (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:
- 4.1.2.1 Increased vehicle traffic increases the risk of wildlife mortality from strikes.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads (Avg. Score: 1.00)

NJ Specific Threats: 4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

4.2.1.5 Tall radio and utility towers with guy lines pose a strike hazard for migrant bats and birds, especially in poor visibility conditions (e.g., fog, nighttime, poor weather conditions).

4.2.2 Management of rights-of-way or communication tower facilities and/or their associated access roads (Avg. Score: 1.00)

NJ Specific Threats: 4.2.2.1 Improper or poorly scheduled vegetation management can cause direct mortality to and may reduce productivity of wildlife.

4.4 Flight Paths

4.4.1 Airplane flight paths (Avg. Score: 2.00)

NJ Specific Threats: 4.4.1.1 Increased noise disturbance to wildlife, disrupting their normal behaviors.

4.4.1.2 Increased risk of collision between airplanes and birds, bats and insects.

5 Biological Resource Use

5.1 Hunting and Collecting Terrestrial Animals

5.1.2 Unintentional effects (Avg. Score: 1.00)

NJ Specific Threats: 5.1.2.2 Disruption of normal wildlife behavior.

5.2 Gathering Terrestrial Plants

5.2.2 Unintentional effects (Avg. Score: 1.00)

NJ Specific Threats: 5.2.2.1 Stepping on nests or young/hatchling animals.

5.2.3 Control (Avg. Score: 1.00)

NJ Specific Threats: 5.2.3.2 Clearing of scrub-shrub vegetation [and snags] diminishes cover and nesting habitat.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized) (Avg. Score: 2.00)

NJ Specific Threats: 6.1.1.1 Inappropriate use of off-road vehicles creates new roads/trails which fragments habitat.

6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.

6.1.1.3 Increased risk of harassment that results in a change in wildlife behavior and/or direct mortality from vehicle strikes.

6.1.1.4 Increased noise pollution.

6.1.1.6 Off-road vehicles can be a mechanism of transference of wildlife diseases and invasive plant species if gear and apparel are not properly sanitized between sites.

6.1.5 Wildlife observation and photography (Avg. Score: 1.00)

NJ Specific Threats: 6.1.5.1 Improperly conducted recreational activities may disrupt normal wildlife behaviors which can result in reduced reproductive success or survival, abandonment of critical sites, etc.

6.1.5.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.1.7 Other (Avg. Score: 1.00)

NJ Specific Threats: 6.1.7.1 Use of recreational or commercial pyrotechnics may cause temporary disturbance to wildlife, in particular to nesting birds.

6.1.7.3 Drone use in areas with sensitive wildlife (e.g., nesting and foraging birds, migrating and foraging/feeding whales) can alter their behavior and can cause disturbance that impacts their reproductive and/or foraging success.

6.2 Military Exercises

6.2.1 Military exercises (Avg. Score: 1.00)

NJ Specific Threats: 6.2.1.1 Military testing and training exercises may inflict disturbance and potential physical harm to wildlife.

6.2.1.3 Lack of opportunity for non-federal wildlife managers to influence activities on military bases may result in detrimental impacts to SGCN and/or missed opportunities to engage in projects that benefit SGCN.

6.3 Work and Other Activities

6.3.1 Unauthorized research projects at significant habitats (Avg. Score: 1.00)

NJ Specific Threats: 6.3.1.1 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.1.2 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.1.3 Activities conducted without proper precautions may disturb and disrupt normal wildlife behaviors, which may impact reproductive success or survival, cause abandonment of critical sites, etc.

6.3.2 Authorized research projects at significant habitats (Avg. Score: 1.00)

NJ Specific Threats: 6.3.2.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.2.3 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.2.4 Activities conducted without proper precautions may disturb and disrupt normal wildlife behaviors, which may impact reproductive success or survival, cause abandonment of critical sites, etc.

6.3.3 Other "work" unrelated to research (Avg. Score: 1.00)

NJ Specific Threats: 6.3.3.4 Workers may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

7 Natural Systems Modifications

7.1 Fire and Fire Suppression

7.1.1 Increase in Fire Frequency/Intensity (Avg. Score: 1.00)

NJ Specific Threats: 7.1.1.1 Increase in frequency and intensity of wild fires as a result of droughts and heat waves drying out vegetation and litter.

7.1.1.2 Increase in frequency of wild fires as a result of illegal activities.

7.1.1.3 Unnatural fire regimes occurring as a result of military exercises.

7.1.2 Suppression of Fire Frequency/Intensity (Avg. Score: 3.00)

NJ Specific Threats: 7.1.2.1 Shift in vegetative communities as a result of suppression of natural fires.

7.1.2.2 Lack of diversity in age structure and composition of vegetation due to the suppression of fire.

7.2 Dams and Water Management/Use

7.2.1 Abstraction of Surface Water (domestic use) (Avg. Score: 1.00)

NJ Specific Threats: 7.2.1.5 Abstraction of surface water may deplete upland mesic habitats of water needed by plants and wildlife.

7.2.2 Abstraction of Surface Water (commercial use) (Avg. Score: 1.00)

NJ Specific Threats: 7.2.2.5 Abstraction of surface water may deplete upland mesic habitats of water needed by plants and wildlife.

7.2.3 Abstraction of Surface Water (agricultural use) (Avg. Score: 1.00)

NJ Specific Threats: 7.2.3.6 Abstraction of surface water may deplete upland mesic habitats of water needed by plants and wildlife.

7.2.5 Abstraction of Ground Water (domestic use) (Avg. Score: 2.00)

NJ Specific Threats: 7.2.5.2 Abstraction of ground water may deplete upland mesic habitats of water needed by plants and wildlife.

7.2.6 Abstraction of Ground Water (commercial use) (Avg. Score: 2.00)

NJ Specific Threats: 7.2.6.2 Abstraction of ground water may deplete upland mesic habitats of water needed by plants and wildlife.

7.2.7 Abstraction of Ground Water (agricultural use) (Avg. Score: 2.00)

NJ Specific Threats: 7.2.7.2 Abstraction of ground water may deplete upland mesic habitats of water needed by plants and wildlife.

7.2.13 Stream Burial (Avg. Score: 2.00)

NJ Specific Threats: 7.2.13.1 Eliminates riparian habitats.

7.2.13.2 Eliminates in-stream habitat and water resources for wildlife.

7.3 Other Ecosystem Modifications

7.3.2 Inappropriate timing of mowing (Avg. Score: 2.00)

NJ Specific Threats: 7.3.2.1 Increased risk of direct mortality and/or reduced productivity of wildlife, as well as reduced use by migrating species.

7.3.4 Lack of natural disturbance patterns or ecosystem functions due to species loss (Avg. Score: 1.00)

NJ Specific Threats: 7.3.4.1 The management and/or loss of beavers decreases natural disturbance patterns.

7.3.4.3 The extinction of prehistoric herd grazers and the more recent decline of the state's dairy industry has reduced the low-impact maintenance of early successional habitat relied upon by wildlife.

7.3.4.5 The lack of forest disturbance minimizes the diversity of herbaceous vegetation and other shrubs and trees that need a lot of sunlight to grow.

7.3.5 Poor habitat management (Avg. Score: 2.00)

NJ Specific Threats: 7.3.5.1 Improper or poorly scheduled maintenance of man-made corridors (e.g., roadsides and medians) can cause direct mortality to and may reduce productivity of wildlife.

7.3.5.5 Habitat management that alters or removes vegetation without implementing long-term management increases the risk of invasive and exotic plants establishing themselves, outcompeting native vegetation.

7.3.5.6 Habitat management, including that which occurs on public and private lands, that does not consider timing and species' behaviors can result in the direct mortality and/or alteration or loss of habitat.

7.3.5.10 Ditching, draining and filling of marshes and wetlands eliminates habitat and degrades the remaining surrounding areas for wildlife.

7.3.5.12 Lack of diversity in age structure and composition of vegetation due to lack of natural disturbances and/or vegetation management.

7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

7.3.5.17 Decreased diversity in height and species of herbaceous vegetation resulting in reduced cover and food for nesting and foraging wildlife.

7.3.5.18 Lack of funding or competitive market prices to maintain native grasslands for grassland-dependent species causes conversion of fallow or hay fields to other crops or shrublands.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species (Avg. Score: 2.00)

NJ Specific Threats:

8.1.1.1 Displace or outcompete native species for resources.

8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.

8.1.1.4 Invasive, non-native animals increase the risk of predation on native animals and/or herbivory on native vegetation.

8.1.1.5 Invasive, non-native animals and plants increase the risk of introduction and transference of diseases

8.1.4 Invasive non-native terrestrial/wetland animals (Avg. Score: 2.00)

NJ Specific Threats:

8.1.4.1 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.4.2 Free-roaming and feral domestic animals such as cats and dogs causes direct mortality of wildlife and disturbance to wildlife breeding and resting areas.

8.1.5 Invasive non-native terrestrial/wetland plants (Avg. Score: 3.00)

NJ Specific Threats:

8.1.5.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.2 Problematic Native Species/Diseases

8.2.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats:

8.2.1.2 Invasive pathogens and insects may increase in range and abundance as limiting factors (such as temperature) are altered as a result of climate change.

8.2.1.4 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.2.2 Named Species (Avg. Score: 1.00)

NJ Specific Threats:

8.2.2.2 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.5 Viral/Prion-induced Diseases

8.5.2 Named Species (Disease) (Avg. Score: 1.00)

NJ Specific Threats:

8.5.2.1 Diseases such as West Nile Virus, arenavirus, sudden oak death, Avian Influenza, and snake fungal disease cause morbidity or mortality to native populations.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.1 Domestic and Urban Waste Water

9.1.1 Sewage (Avg. Score: 1.00)

NJ Specific Threats: 9.1.1.3 Contaminants in sewage treatment effluents and Combined Sewer Overflows can cause developmental and behavioral abnormalities and reproductive failure in wildlife.

9.1.2 Run-off (Avg. Score: 2.00)

NJ Specific Threats: 9.1.2.3 Contaminants from road runoff (oil, sediment, salt, etc.) impact native vegetation and the species that rely upon them, degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2 Industrial and Military Effluents

9.2.1 Oil Spills (Avg. Score: 1.00)

NJ Specific Threats: 9.2.1.1 Oil spills render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.1.2 Oil spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.3 Other (Avg. Score: 1.00)

NJ Specific Threats: 9.2.3.1 Point and nonpoint source pollution such as polychlorinated biphenyls (PCBs), pesticides, heavy metals, and endocrine disrupting compounds (EDC's) into freshwater and marine systems pose threats to wildlife through direct contact and/or ingestion, and to aquatic species and their predators through bioaccumulation, impacting the reproductive success and neurological function of many avian and fish species.

9.2.3.2 Chemical spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.3.3 Chemical spills may render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.4 Other: Hydrofracturing (Avg. Score: 1.00)

NJ Specific Threats: 9.2.4.1 Contaminants from hydrofracturing degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2.4.2 Uncontrolled effluents escaping from hydrofracturing facilities can cause injury to wildlife and alter normal behaviors.

9.3 Agricultural and Forestry Effluents

9.3.2 Soil Erosion and Sedimentation (Avg. Score: 1.00)

NJ Specific Threats: 9.3.2.2 Soil erosion and sedimentation limit the re-establishment of plants needed by terrestrial wildlife as cover and a food base.

9.3.3 Herbicides and Pesticides (Avg. Score: 2.00)

NJ Specific Threats: 9.3.3.1 Pesticides degrade terrestrial and aquatic habitats, especially streams, ponds and wetlands. Aquatic wildlife are particularly sensitive to these contaminants, which can cause developmental and behavioral abnormalities and reproductive failure. Some contaminants may bioaccumulate in predatory fish and birds and disrupt reproduction.

9.3.3.3 Use of pesticides can directly harm non-target species through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture (Avg. Score: 1.00)

NJ Specific Threats: 9.3.5.3 Use of pesticides and herbicides can minimize the abundance of invertebrates needed as a food source for many birds.

9.3.5.4 Improper use of current insecticides, such as those containing esfenvalerate, prallethrin, or piperonyl butoxide, or past use of pesticides containing chlordane still present in the soils, are toxic to various wildlife species, and can cause injury, mortality, or other effects that impair population viability.

9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.5 Air-Bourne Pollutants

9.5.1 Acid Rain (Avg. Score: 2.00)

NJ Specific Threats: 9.5.1.1 Causes acidification of water bodies, resulting in changes to aquatic and marine communities and reducing biodiversity, and creating conditions that are unsuitable for some aquatic (freshwater and marine) and semi-aquatic species that are sensitive to pH shifts.

9.5.1.2 Leaches calcium from the soils which in turn reduces the availability of prey, particularly calcium-rich prey such as snails.

9.5.2 Smog (Avg. Score: 1.00)

NJ Specific Threats: 9.5.2.1 Fine airborne particulate pollutants (such as smoke from controlled burns, soil particles from plowing arid soil, etc.) can adversely affect low mobility wildlife species, including avian species during nesting.

9.5.4 Other (Avg. Score: 1.00)

NJ Specific Threats: 9.5.4.1 Dust and/or airborne sedimentation from construction sites, agricultural operations or related earth disturbances can introduce mineral or organic sediments into adjacent wildlife habitats, degrading their quality and suitability for wildlife short-term and/or long-term.

9.5.6 Herbicides and Pesticides (Avg. Score: 2.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

9.6 Excess Energy

9.6.1 Light Pollution (Avg. Score: 2.00)

NJ Specific Threats: 9.6.1.1 Artificial lighting can reduce suitability of adjacent habitat for species sensitive to artificial lights by disorienting wildlife, reducing foraging suitability or success, or increasing visibility to predators, resulting in reduced diversity and/or productivity of species in adjacent habitat.

9.6.3 Noise Pollution (Avg. Score: 1.00)

NJ Specific Threats: 9.6.3.1 Acute and chronic noise pollution in and adjacent to terrestrial and aquatic (marine and freshwater) environments could disrupt normal behaviors of wildlife such as migration, communication, feeding, eluding predators, resting and breeding, etc.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 1.50)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.2 Droughts

11.2.1 Droughts (Avg. Score: 2.00)

NJ Specific Threats: 11.2.1.1 Contribute to hardened soils, decreasing water recharge during rains and increasing the likelihood of flash floods during storms.

11.2.1.2 Lead to lower groundwater levels and therefore, less available water for people and habitats.

11.2.1.3 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

11.3 Temperature Extremes

11.3.1 Temperature extremes (Avg. Score: 2.00)

NJ Specific Threats: 11.3.1.1 Increasing temperatures may cause habitat loss and degradation by desiccating and/or raising the temperatures of small wetlands and streams leading to the loss of freshwater mussels and other aquatic species and species reliant upon these habitats.

11.3.1.2 Increased temperatures can negatively impact wetland, riverine, lacustrine and vernal pool-associated or -dependent wildlife by reducing flows, increasing water temperatures, lowering water levels and causing premature drying of vernal habitats.

11.4 Storms and Flooding

11.4.1 Storms and flooding (Avg. Score: 2.00)

NJ Specific Threats: 11.4.1.6 Increased storms and flooding reduce nesting success, especially for ground-nesting birds.

11.4.2 Increased rainfall (Avg. Score: 2.00)

NJ Specific Threats: 11.4.2.2 Extreme rain events can damage wildlife nesting and resting habitats, including impacts to avian eggs and chick and small mammal survivorship.

11.4.2.3 More frequent rain events can alter terrestrial and wetland vegetation communities as well as wetland hydrology, shifting wildlife community use.

11.6 Phenology Shifting or Alteration

11.6.2 Phenology shifts related to predator-prey ecology (Avg. Score: 2.00)

NJ Specific Threats: 11.6.2.1 Alters inter-specific relationships (e.g., competition, parasitism, predation) of wildlife, ultimately leads to detrimental impacts on the ecological system.

11.6.2.2 Shifts timing of species migration, breeding and hibernation, and available food resources, causes redistribution of species, or mortality for species that are unable to relocate due to their already isolated habitat or limited mobility.

11.6.3 Phenology shifts related to species redistribution (Avg. Score: 1.00)

NJ Specific Threats: 11.6.3.1 Shifts in timing of species migration, breeding and hibernation, and available food resources, as a result of wildlife range shifts driven by climate change.

11.6.3.2 Shifts in nesting times or egg incubation durations can limit nest success and longterm populations.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 1.00)

NJ Specific Threats: 12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.6 Lack of information regarding migratory pathways and response of wildlife to lights and noise associated with offshore wind turbines.

12.1.2 Lack of up-to-date existing information (Avg. Score: 1.00)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.2.2 Lack of wildlife monitoring at sites with structures that pose high risk of mortality to SGCN wildlife.

12.1.3 Need to answer research question (Avg. Score: 2.00)

NJ Specific Threats:
- 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.
- 12.1.3.4 Lack of information regarding the potential short- and long-term impacts of wind turbines and other tall coastal structures on migratory populations.

12.1.4 Need to develop new technique (Avg. Score: 1.00)

NJ Specific Threats:
- 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.
- 12.1.4.2 Improve and evaluate survey methods for species not easily detected through standard survey methods.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 2.00)

NJ Specific Threats:
- 12.3.0.1 Regulatory habitat protections within state land use regulations are spatially limited to specific geographic areas (e.g., Pinelands, Coastal Area) or geographic features (e.g., wetlands, streams) and so fail to protect critical habitats that exist outside of these regulated areas.
- 12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.
- 12.3.0.9 Prescribed burns implemented by the NJ Forest Fire Service are constrained by State air quality regulations to a timeframe where seasonal weather conditions are less than ideal for effective burning. As a result, the Forest Fire Service is limited in the number of overall prescribed burns it can implement to restore habitat for wildlife.
- 12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 2.00)

NJ Specific Threats:
- 12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.
- 12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.
- 12.4.0.5 Bureau of Forest Fire Management policy has traditionally implemented prescribed burns on State lands for the sole purpose of public safety (i.e., addressing hazard fuel reduction), missing opportunities to burn in a manner that would additionally manage habitat for ecological diversity.
- 12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 2.00)

NJ Specific Threats:
- 14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.
- 14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 2.00)

NJ Specific Threats: 15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.1 Enhance critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates through incentive programs with adjacent private landowners to increase the effective size of the habitat.

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.3 Secure and promote the protection/restoration of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through incentive programs.

1.2.1.6 Secure and promote the protection/restoration of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.12 Create incentives (non-monetary and/or monetary) for land developers to redevelop abandoned areas (e.g., shopping centers, office complexes) to minimize the loss of natural habitats and reduce the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.14 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of herbicides and pesticides, and implementing more ecologically safe strategies when using such products.

1.2.1.16 Create incentives (non-monetary and/or monetary) within State regulations (mitigations requirements or credit, BMP satisfaction, etc.) to promote the use of retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.17 Develop a public-relations oriented certification program for private retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.18 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and land managers to control and reduce the impacts of invasive, native and non-native species in order to increase structural habitat diversity.

1.2.1.19 Create incentives for federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to farmers, woodland landowners, and private landowners to adopt and/or endorse consistent BMPs concerning controlled burns to maintain and/or improve wildlife habitat.

1.2.1.20 Coordinate across government agencies and non-government organizations to create or expand upon tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMP's.

1.2.1.21 Create and/or support market-based programs that subsidize or create branding for products derived sustainably from managed wildlife habitats.

1.2.1.22 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to horse/livestock farm owners and managers to increase structural habitat diversity in and around the farms by managing vegetation for a variety of species, in particular, farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

1.2.1.23 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to provide cost shares and/or plan approvals for management based on management approaches and prescriptions.

1.2.1.24 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners, with habitat of suitable patch size to support breeding grassland-dependent species, to alter the timing of vegetation management to benefit grassland and pollinator species.

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

1.2.1.28 Create incentives to implement dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

2 Direct Management of Natural Resources

2.3 Fire management

2.3.2 Fuel reduction

2.3.2.1 Prevent wildfires by reducing natural fuel (e.g., leaf litter).

2.3.3 Prescribed burning

2.3.3.1 Evaluate different management techniques of prescribed burns that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

2.3.3.3 Conduct prescribed burning to improve wildlife habitat.

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.1 Control invasive insect infestations by implementing BMP strategies through biological, chemical and/or mechanical means that will depress, or when appropriate, eradicate populations in a manner that avoids excessive harm to non-target species using BMPs to control infestations and limit their spread based on an inventory of invasive insect distribution and response to outbreaks.

2.8.0.2 Develop, implement, monitor and evaluate pest control/management strategies to reduce the impacts of over-abundant wildlife species (native and/or native, invasive species) on native vegetation and the degradation of habitats supporting SGCN. Over-abundant wildlife species include but are not limited to mute swans, Canada geese, beaver and white-tailed deer.

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.6 Implement long-term management of invasive and/or non-native plants to help maintain functioning ecological systems and biological diversity, and to enhance travel corridors. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.8 Protect significant natural and/or unique communities by implementing best management practices when conducting habitat restoration strategies.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.10 Minimize the loss of important habitats (e.g., coastal scrub-shrub and grassy habitats, high and low marsh habitats, etc.) that provide nesting, migrating, and wintering areas for SGCN birds and other coastal and marsh-dependent species through habitat restoration efforts.

2.10.0.11 Restore and/or enhance critical migratory terrestrial and aquatic habitats (e.g., beach, grasslands, forest, scrub-shrub, etc.) for songbirds, raptors, shorebirds, waterfowl, bats and invertebrates through habitat restoration efforts and expand habitat restoration to adjacent private lands to increase the effective size of the habitat.

2.10.0.12 Create and/or maintain scrub-shrub habitats through revegetation efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.21 Restore and/or enhance understory habitats that suppress invasive species and provide critical resources and enhance sheltering, foraging, and nesting cover for wildlife.

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.10.0.23 Restore and/or enhance roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.11.0.3 Create suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats through vegetation management.

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through vegetation management.

2.11.0.6 Reclaim degraded rare species habitats by conducting vegetation management needed to restore habitat value for the documented/target SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.8 Maintain, enhance and/or restore biologically appropriate buffers for SGCN-inhabited/used freshwater wetlands through vegetation management.

2.11.0.9 Minimize habitat loss of critical coastal habitats that provide nesting, migrating, and wintering areas for birds and other coastal species by maintaining or enhancing these areas through vegetation management.

2.11.0.12 Conduct vegetation management to create feeding and roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

2.11.0.13 Implement best management practices (BMPs), protective strategies, and guidelines for vegetation management to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.11.0.16 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.11.0.20 Create and/or maintain scrub-shrub habitats through management efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.11.0.21 Minimize the degradation, alteration and/or changes in hydrology of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and subsequent disturbances to and behavioral changes of wildlife by maintaining or enhancing these areas and biologically appropriate buffers through habitat management and/or revegetation or restoration efforts.

2.11.0.23 Implement appropriate habitat management actions in areas where natural disturbances, such as wildfire, have been precluded.

2.11.0.25 Conduct vegetation management along access roads following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.28 Conduct vegetation management in agricultural areas following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.29 Conduct vegetation management on transportation and service corridors (i.e., rights-of-way) following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.31 In areas where vegetative communities are shifting due to fire suppression and controlled burns are not feasible, manage vegetation to improve wildlife habitat.

2.11.0.32 Increase structural habitat diversity around and when feasible, within agricultural landscapes by managing vegetation for a variety of species, in particular, those farms that have removed scrub-shrub habitat and/or fragmented forests, and by implementing ecologically best practices (e.g., no-till farming, maintaining hedgerows, buffer set-asides, etc.).

2.11.0.33 Increase structural habitat diversity by implementing long-term vegetation management to minimize the potential for the establishment of invasive and/or non-native plants that may outcompete native vegetation.

2.11.0.34 Increase structural habitat diversity by managing residential, commercial and recreational areas' landscapes for a variety of species. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.

2.11.0.37 Increase structural habitat diversity by minimizing the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats which benefits wildlife.

2.11.0.38 Increase structural habitat diversity in and around horse/livestock farms by managing vegetation for a variety of species, in particular, in and around farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

2.11.0.39 Increase structural habitat diversity in and around solar farms by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.40 Increase structural habitat diversity surrounding areas used for energy, mining, and transportation and service corridors by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides, and avoid managing habitat during the breeding seasons for ground-nesting birds, reptiles, amphibians and small mammals.

2.11.0.41 Increase structural habitat diversity through the implementation of a variety of vegetation management practices such a prescribed burns (either increasing or decreasing their frequency depending on the site and objective), plantings, etc. that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.42 Increase structural habitat diversity within wind farms for terrestrial bound and low-flying species and around wind farms for other wildlife by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.13 Wildlife damage management

2.13.0 Nuisance fish and wildlife damage

2.13.0.5 Investigate the impacts of human-subsidized and/or naturally occurring predator species on SGCN to assess the need for integrated wildlife damage management techniques (e.g., predator exclosures, fish blockages, electric fence, culls) and/or policy changes on state land management that minimize the impacts of human-subsidized predators.

2.13.0.7 Develop, implement, monitor and evaluate management strategies to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

2.13.0.8 Implement and assess management strategies to control and reduce the impacts of detrimental species and diseases that pose threats to native wildlife or communities.

2.14 Wildlife disease management

2.14.0 Wildlife disease strategy development and investigation

2.14.0.1 Investigate diseases/pathogens impacting SGCN and/or their habitats.

2.14.0.2 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.6 Conduct long-term studies on resident and migratory SGCN to determine if there are changes to the populations' demography (productivity, survival, dispersal) and/or to their critical and/or supporting habitats (i.e., diminishing in value, acreage or connectivity, etc.), in particular changes that would not maintain SGCN at viable levels for species populations. Update data and GIS maps; provide updated information to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.9 Identify SGCN (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources, and compile/collect and evaluate data/information regarding potential management strategies to improve the availability of such SGCN's food resources.

3.0.0.10 Conduct long-term studies to evaluate the effectiveness of management strategies implemented to enhance food/prey availability for SGCN [whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources] through studies that investigate the populations and health of the food resources as well as the target SGCN. Revise management strategies as needed and continue to monitor the effectiveness of the efforts.

3.0.0.11 Develop, implement and evaluate the effectiveness of town plans that avoid impacts to SGCN species and their habitats.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.25 Identify pathways of migratory SGCN in the Atlantic Coastal and Marine Regions (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and use the data to help evaluate the potential short- and long-term impacts of wind turbines, radio towers, utility guy lines, and other tall coastal structures on migratory populations.

3.0.0.26 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species including objectives and guidance pertaining to and the condition/status of critical and supporting habitats.

3.0.0.30 Conduct research to investigate the feasibility of managing and/or creating roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

3.0.0.31 Conduct short- and long-term studies (e.g., wildlife surveys and habitat assessments) to evaluate the effectiveness of vegetation management efforts to maintain, enhance and/or create roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.2 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.0.5 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

3.2.0.10 Evaluate the effectiveness of sanitation/decontamination protocols in minimizing the transference of wildlife diseases and invasive plant species.

3.2.0.11 Investigate the impacts of ORV use as a mechanism to spread wildlife diseases and invasive plant species to native wildlife and habitats. Integrate this information when mapping undeveloped roads and trails to identify potentially sensitive areas in northern NJ forests.

3.2.0.17 Conduct monitoring at constructed wind farms (within or outside of NJ) to assess the impacts on migratory species (birds, bats, insects) and determine if NJ's land use planning efforts and/or smart-growth plans need to be revised.

3.2.0.24 Develop, implement and evaluate the effectiveness of BMPs for lighting of/on tall structures that minimize harm to and/or disorient wildlife, in particular but not limited to migratory birds, bats and invertebrates. Implement BMPs into state, county and local permitting processes.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.3 Baseline inventory

3.2.3.9 Investigate hazardous environmental issues that may impact grassland invertebrates.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.2 Monitoring

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.10 Evaluate the efficacy and success of different management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.3.2.11 Evaluate and compare the effectiveness of delayed mowing of warm season grass fields versus cool season hay fields to benefit grassland-dependent species.

3.3.2.12 Evaluate and compare the effectiveness of different management techniques (e.g., prescribed burning, mowing, brush-hogging, etc.) for maintaining suitable habitat for grassland-dependent species and species dependent upon early successional habitats.

3.3.2.13 Evaluate the effectiveness of management strategies (e.g., timing restrictions for mowing, cooperative agreements with utility companies for maintenance of rights-of-ways) that maintain and enhance large existing areas of grassland in perpetuity. Focus on habitat patches that can be managed to enhance the total size of suitable grassland habitat and create interspersed early-successional habitat.

3.3.2.15 Investigate the effectiveness of management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.3.2.20 Once a system is developed for reporting and qualifying new locations of invasive species, develop, implement and monitor/evaluate invasive species removal strategies at identified locations. Priority should be given to those areas critical to SGCN and/or contain unique and/or rare plant communities supporting SGCN and/or other fish/wildlife species.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.3 Develop/improve management techniques that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.8 Develop best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5.3.9 Develop strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.3.21 Develop management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.22 Identify (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) and modify management strategies (e.g., timing restrictions for mowing, cooperative agreements with utility companies for maintenance of rights-of-ways), based on research, that maintain and enhance large existing areas of grassland in perpetuity.

3.5.3.24 Based on research, modify management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.3.29 Explore the use of alternative vegetation (i.e., commodity crops) to address agriculture concerns.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.2 Develop, implement, monitor and evaluate management strategies to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

3.5.4.10 Develop BMPs for lighting of/on tall structures that minimize harm to and/or disorientation of wildlife, in particular but not limited to migratory birds, bats and invertebrates.

3.5.4.14 Develop and implement agreements, and update existing agreements, with government agencies regarding the protection of critical SGCN habitats (e.g., significant breeding populations of beach nesting birds, colonial waterbird nesting areas, bat colonies, etc.).

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.17 Investigate new, non-invasive techniques for SGCN population evaluation through literature review, expert opinion, trial studies (if low risk), etc.

3.5.4.18 Investigate the effectiveness of survey techniques through selected “ground truthing” and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

4 Education

4.1 Educator/Instructor training

4.1.0 Public education

4.1.0.1 Provide educational resources and training programs to private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

5 Facilities and Areas

5.15 Wildlife Management Areas

5.15.6 Roads

5.15.6.1 Clearly post areas/roads where vehicle access is permitted.

5.15.6.2 Clearly post areas/trails where vehicle access is not permitted.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.1 Enhance and increase the effective size of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates by securing adjacent habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.3 Secure and protect riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.5 Secure and protect critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.1 Promote the protection of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates and enhance these lands by increasing the effective size through conservation area designations of stopover habitats and adjacent private lands.

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.3 Increase the protection of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through conservation area designations.

6.3.0.5 Promote the protection of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through conservation area designations.

6.4 Private lands agreements

6.4.0 Private land agreement strategies

6.4.0.1 Enter into private lands agreements to expand control burns on private lands, in particular those adjacent to conserved lands to improve SGCN habitats.

7 Law Enforcement

7.1 Law enforcement

7.1.4 Scale Unspecified

7.1.4.4 Improve enforcement of policies/regulations aimed at protecting and preserving critical coastal and marsh habitats, and secure mitigation for losses that create an environmental benefit.

7.1.4.5 Enforce current policies and/or regulations to increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal SGCN, and implement and enforce amended policies/regulations.

7.1.4.7 Increase law enforcement presence to enforce regulations governing recreational activities (e.g., the use of personal watercraft and off road vehicles, caving, rock climbing, etc.) on conserved lands and within other sensitive habitats, and discourage activities that cause harm or disturbance to vegetation, wetlands, fish and wildlife.

7.1.4.8 Implement policies that protect critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates.

7.1.4.10 Implement policies that promotes expanding acreages and enhances the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

7.1.4.11 Implement and enforce policies/regulations that will increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.17 Improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

7.1.4.19 Implement policies that protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

7.1.4.21 Implement regulations for lighting of/on tall structures that will minimize harm to and/or disorientation of wildlife, and enforce within state, county and local permitting processes.

7.1.4.22 Implement policies and/or regulations that prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

7.1.4.25 Encourage the enforcement of municipal laws regulating domestic pets that may predate on wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.4 Engage government agencies, conservation partners and other stakeholders in constructive dialogues encouraging them to influence policy change and the creation of incentives through a habitat bill and/or municipal ordinances for backyard habitat.

8.1.0.13 Engage DOD in a constructive dialogue regarding strategies to minimize disturbances to all SGCN (i.e., beyond their federal requirements) from forest management and other practices on their lands.

8.1.0.15 Engage government agencies, conservation partners and other stakeholders in discussions encouraging and supporting the creation of laws and policies requiring vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

8.1.0.16 Engage local governments in discussions regarding the importance of them adopting/passing ordinances which require assessing and addressing secondary impacts (i.e., ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.21 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation human-subsidized and/or overabundant, native species cause to local nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.22 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation invasive species cause to native nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.33 Engage government agencies, conservation partners and other land managers, communities, landowners, and commercial and industrial stakeholders in discussions regarding the importance of protecting and methods to protect priority wetlands beyond the levels afforded through regulation by maintaining and/or restoring optimal biological buffers around wetlands.

8.1.0.37 Enlist landowners and NJ citizens in the protection of and survey efforts for SGCN, in particular rare species, by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management and wildlife-related volunteer programs.

8.1.0.44 Engage conservation partners, stakeholders, government agencies and other land stewards in constructive dialogues encouraging their inclusion of controlled burns in forest and other stewardship plans.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.1.0.48 Form cooperative partnerships with transportation and shipment agencies and companies to facilitate habitat creation and enhancement away from and outside of project areas and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.2 Recruitment and retention activities

8.2.3 For wildlife watching

8.2.3.1 Develop and implement nature-focused tourism opportunities including wildlife viewing sites, interpretive signage highlighting unique ecosystems/habitats, and wildlife-related recreational opportunities that do not negatively impact SGCN or their habitats.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.5 Develop and provide (or otherwise make publicly available) educational programs and/or materials that provide homeowners information on how to design dwellings and other structures in a manner that is wildlife friendly (e.g., using bird-safe glass on windows).

8.3.0.6 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners, land managers and local communities to discourage the presence of managed cat colonies and trap, neuter and release programs in wildlife habitats.

8.3.0.9 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners and land managers to include only native plants in landscaping and restoration projects. Provide information to assist them in detecting problematic establishment of invasive, non-indigenous plants.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.19 Develop an educational outreach program for the public on the devastating effects predators can have on native nesting wildlife.

8.3.0.25 Develop educational outreach programs for landowners, nurseries and the general public regarding the negative impacts of invasive and non-native plants on our natural communities.

8.3.0.27 Develop educational outreach programs for public and private landowners and land managers regarding the importance of structural habitat diversity, methods to increase diversity, and/or incentive programs available to increase habitat diversity.

8.3.0.28 Develop educational outreach programs for public and private landowners and land managers regarding the importance of managing grasslands for grassland-dependent species, methods of management, and/or incentive programs available.

8.3.0.30 Develop educational outreach programs for private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.6 Develop a plan that directs the creation or expansion of roads and railroads or the re-establishment of abandoned railroads within and adjacent to critical forested habitats in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.15 Develop a plan to minimize fragmentation of terrestrial and aquatic habitats by roads.

9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.7 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.16 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.2 Listed species recovery planning

9.3.2.1 Develop proactive species recovery plans for all endangered and threatened species including guidance and objectives pertaining to critical and supporting habitat to meet and maintain recovery goals.

9.3.3 Habitat management planning

9.3.3.6 Develop a management plan for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

9.3.3.7 Develop a management plan to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

9.3.3.8 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.3.9 Develop a response plan to outbreaks using BMPs to control infestations and limit their spread in a way that avoids excessive harm to non-target species.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.3.13 Develop a management plan that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas and prevents or ameliorates near-term impacts of climate change throughout the State, but in particular within the coastal and Delaware Bay areas.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.20 Develop an action plan for immediate implementation should habitat levels fall below the minimum necessary size and/or structure within the Cape May Peninsula to sustain the avian migration.

9.3.3.21 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.3.24 Develop a plan to improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

9.3.3.26 Develop a management plan for parcels of suitable size to be managed for native herbaceous plant species that support breeding grassland dependent species.

9.3.3.29 Develop habitat management plans aimed at reducing or eliminating negative impacts of ORVs.

9.3.3.32 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3.34 Include controlled burn prescriptions in forest and stewardship plans to improve wildlife habitat.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.3 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.10 Use CHANJ mapping in reviews of proposed energy, mining, transportation and utility service companies/agencies' projects to attempt to maintain habitat connectivity and reduce fragmentation, and identify potential impacts of the projects.

11.1.1.11 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed offshore energy projects relating to drilling, extraction and distribution of petroleum and gas products to reduce habitat destruction and minimize impacts on wildlife.

11.1.1.12 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed solar farm projects to reduce habitat fragmentation and minimize impacts on wildlife.

11.1.1.13 Use the best available science (species data, habitat present, wind farm layout options, wind blade impacts on migratory species, location of migration routes, etc.) when conducting regulatory reviews of proposed wind farm projects to minimize impacts on migratory and resident wildlife and reduce habitat fragmentation.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.2 Provide technical support to public and private landowners and land managers for controlling invasive, native and non-native plant species in order to increase structural habitat diversity.

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.7 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on the importance of maintaining habitat connectivity, minimizing fragmentation, and the use of CHANJ products to help them target areas for such planning.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.11 Provide educational resources, training programs, and on-the-ground guidance to private and public landowners and land managers on the benefits of and for creating young forest and early succession habitat for SGCN.

11.2.0.12 Provide educational resources and technical support to public landowners and land managers for managing grasslands for grassland-dependent species.

11.2.0.14 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters), and to enhance or restore biologically appropriate buffers.

11.2.0.20 Provide educational resources and technical support to public and private landowners and land managers to promote the protection and/or enhancement of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN.

11.2.0.21 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates to promote the protection and/or enhancement of those adjacent habitats to increase the effective size of the migratory habitat.

11.2.0.22 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

11.2.0.23 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to SGCN habitats to promote the protection and/or enhancement of those adjacent habitats to increase the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and that connect conserved SGCN habitats.

11.2.0.25 Provide educational resources, training programs, and on-the-ground guidance to resource managers regarding the assessment of and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) related to residential and commercial development.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.1 Engage partners and stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.3 Provide educational resources, training programs, and on-the-ground guidance to DOD to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop and implement forest management and other practices that minimize disturbances to SGCN (i.e., beyond their federal requirements).

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

11.2.2 With private landowners

11.2.2.1 Provide technical support to farming operations and woodland landowners on ways to decrease clean farming (edge-to-edge) practices and create ecotones to benefit bobwhite and other species dependent on early successional habitat.

100 Law and Policy

100. Legislation

100.1.2 National Level

100.1.2.1 Create legislation to establish markets for warm-season grasses to increase the permanency of this crop on the landscape.

100.1.3 Sub-national Level

100.1.3.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.4 County and Local

100.1.4.1 Enhance critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates through the local ordinances of adjacent private lands to increase the effective size of the habitat.

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.3 Expand the acreages and enhance the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN through local ordinances.

100.1.4.4 Secure wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and biologically appropriate buffers through local ordinances.

100.1.4.5 Secure SGCN-inhabited/used freshwater wetlands and biologically appropriate buffers through local ordinances.

100.1.4.8 Secure critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through local ordinances.

100.1.4.13 Encourage municipal laws regulating domestic pets that may predate on wildlife.

100.1.4.14 Adopt/pass local ordinances which require assessing and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.5.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100.1.5.5 Develop legislation to provide financial support for the New Jersey Invasive Species Strike Team.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.3 Develop policies that will promote the long term protection of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates.

100.3.0.5 Develop policies that will promote improved and secure habitat connections between conserved SGCN habitats.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.7 Amend current policies and/or regulations to increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.14 Develop policies and/or regulations that increase the protective buffers of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) to biologically appropriate distances to benefit SGCN that rely upon these habitats and improve the function of the [associated] aquatic systems.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.19 Develop regulations for lighting of/on tall structures that will minimize harm to and/or disorientation of wildlife, in particular but not limited to migratory birds, bats and invertebrates. Implement BMPs into state, county and local permitting processes.

100.3.0.20 Develop policies and/or regulations that prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

100.3.0.23 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.24 Create legislation to establish markets for warm-season grasses to increase the permanency of this crop on the landscape.

100.3.0.31 Create or expand tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMPs.

100.3.0.40 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.

100.3.0.42 Fully adopt the former Storm water Management Rules' 300ft buffer requirements into the Flood Hazard Area Control Act Rules.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.45 Increase the controlled burn season to focus on restoring vegetative communities.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.48 Propose new State law or regulation mandating that a State-level "development impact fee" be assessed on all new development approved by municipalities (via the Municipal Land Use Law processes), and dedicate such monies to the development and implementation of regional Habitat Conservation Plans (or existing plans/programs serving the same regional function).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.53 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded rights-of-way corridors associated with energy transport/transmission.

100.3.0.54 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded surface mining areas.

100.3.0.56 Develop regulations that when implemented will protect critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates.

100.3.0.57 Develop regulations that when implemented will improve and secure habitat connections between conserved SGCN habitats.

100.3.0.58 Develop regulations that when implemented will promote the expansion of acreages and enhancement of the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.59 Develop regulations that when implemented will increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.65 Develop regulations that when implemented will protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

100.3.0.67 Develop regulations for lighting of/on tall structures that will minimize harm to and/or disorientation of wildlife, and enforce within state, county and local permitting processes.

100.3.0.68 Develop regulations that when implemented will prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

100.3.0.70 Develop regulations that when implemented will facilitate the restoration of dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100.3.0.73 Develop regulations that would exempt the conversion of lawns to native vegetation (beneficial to wildlife) from local lawn ordinances.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.3 Develop policies for mandatory buffer strips on preserved farmlands and state-owned agricultural lands.

100.4.0.4 Create a policy that requires the use of wildlife habitat and corridor mapping products for both regulatory use when conducting project reviews and planning/siting new or expanded rights-of-way projects.

100.4.0.9 Develop and implement policies to minimize the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats in order to benefit wildlife.

100.4.0.12 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.4.0.13 Develop policies for different circumstances (e.g., roadsides and medians, riparian, aquatic and terrestrial habitats) that outline appropriate habitat/vegetation management strategies and schedules to minimize risks to and benefit wildlife.

100.4.0.14 Develop policies to facilitate agreements between eligible entities to manage appropriate conserved lands for grassland-dependent species, and to have access to/obtain restoration funds.

100.4.0.16 Develop policies to implement habitat management strategies that will increase the structural diversity surrounding areas used for energy, mining, and transportation and service corridors which include but are not limited to the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-

100.4.0.17 Develop policies to implement habitat management strategies, including prescribed burns, that will increase the structural diversity on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies to control and reduce the impacts of invasive, non-native species in order to increase structural habitat diversity.

100.4.0.18 Develop policies to minimize the extent of infrastructure associated with energy and service corridors or areas (e.g., wind and solar farms, pipelines, utility lines) and that require the implementation of habitat management strategies that will increase the structural diversity in the area including (e.g., the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides).

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.24 Develop policies to provide financial support for the New Jersey Invasive Species Strike Team.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Marsh Birds

Focal species that comprise this Conservation Target:

Black Rail	Common Tern	Forster's Tern
Little Blue Heron	Snowy Egret	Tricolored Heron

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.1.2 Residential development using materials that cause collision hazards (Avg. Score: 1.00)

NJ Specific Threats: 1.1.2.1 Collision risk to volant species (birds, bats and invertebrates).

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.2.2 Commercial development using materials that cause collision hazards (Avg. Score: 2.00)

NJ Specific Threats: 1.2.2.1 Collision risk to volant species (birds, bats and invertebrates).

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats: 1.3.1.2 Loss, alteration and/or degradation of habitat.

1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture (Avg. Score: 0.50)

NJ Specific Threats: 2.1.1.2 Conversion, and subsequent loss, of high salt marsh to low salt marsh threatens high-marsh dependent species and those dependent on the marsh-upland ecotone.

2.1.1.4 Salt hay farming on Delaware Bay marshes, and the subsequent conversion of those farms to fully tidal marshes, results in compressed sediments that are less resilient to coastal forces of erosion and sea level rise.

3 Energy Production and Mining

3.1 Oil and Gas Facilities and Pipelines

3.1.1 Distribution processes of petroleum and other liquid hydrocarbons (Avg. Score: 1.00)

NJ Specific Threats: 3.1.1.1 Fragments terrestrial and aquatic habitats.

3.1.1.2 Loss, alteration and/or degradation of habitat.

3.1.1.3 Increased risk of oil spills.

3.1.1.4 Increased noise pollution.

3.1.1.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.

3.1.2 Natural gas distribution processes (Avg. Score: 1.00)

NJ Specific Threats: 3.1.2.2 Loss, alteration and/or degradation of habitat.

3.1.2.3 Increased risk of gas leaks and explosions.

3.1.2.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.

3.2 Mining and Quarrying

3.2.4 Sand Dredging (outside shipping lanes) (Avg. Score: 0.83)

NJ Specific Threats: 3.2.4.1 Loss, alteration and/or degradation of benthic marine habitats.

3.2.4.2 Increased noise pollution.

3.2.4.3 Potential for direct mortality of benthic organisms.

3.3 Renewable Energy

3.3.1 Wind Power (Avg. Score: 1.33)

NJ Specific Threats: 3.3.1.1 Turbines, blades, and structure foundations create a collision risk to volant species (birds, bats and invertebrates) and marine animals.

3.3.1.2 Fragments terrestrial habitats.

3.3.1.3 Loss, alteration and/or degradation of habitat.

3.3.1.4 Increased commercial infrastructure.

3.3.2 Solar Power (Avg. Score: 1.00)

NJ Specific Threats: 3.3.2.2 Loss, alteration and/or degradation of habitat.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 1.17)

NJ Specific Threats: 4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.1.2 Movement of cars and other vehicles on roads and railroads (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 4.1.2.1 Increased vehicle traffic increases the risk of wildlife mortality from strikes.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads (Avg. Score: 1.00)

NJ Specific Threats: 4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

4.2.1.5 Tall radio and utility towers with guy lines pose a strike hazard for migrant bats and birds, especially in poor visibility conditions (e.g., fog, nighttime, poor weather conditions).

4.3 Shipping Lanes

4.3.1 Movement of large ships in shipping lanes (Avg. Score: 0.33)

NJ Specific Threats: 4.3.1.2 May disturb nesting and foraging of shoreline birds and aquatic animals, and/or alter migratory patterns of aquatic and marine wildlife.

4.3.2 Dredging impacts (Avg. Score: 1.50)

NJ Specific Threats: 4.3.2.2 Historic and current reuse of containment facilities over time may disrupt/displace nesting birds.

4.3.2.3 Transportation of materials to and from disposal facilities may pose temporary disturbance to wildlife impacting foraging and nesting success.

4.4 Flight Paths

4.4.1 Airplane flight paths (Avg. Score: 1.00)

NJ Specific Threats: 4.4.1.1 Increased noise disturbance to wildlife, disrupting their normal behaviors.

4.4.1.2 Increased risk of collision between airplanes and birds, bats and insects.

5 Biological Resource Use

5.4 Fishing and Harvesting of Aquatic Resources

5.4.2 Intentional Use (large scale) (Avg. Score: 0.83)

NJ Specific Threats: 5.4.2.1 Overharvesting of one species may lead to detrimental impacts on another; e.g., overharvest of menhaden affecting piscivorous birds.

5.4.3 Unintentional effects (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.4.3.1 Abandoned fishing tackle and gear, crab pots without excluders and ghost crab pots increase the risk of injury and death to marine mammals, sea turtles, sea birds, pinnipeds and fish species as well as terrestrial and semi-aquatic species as a result of consuming tackle or gear, entrapment and entanglement in gear.

5.4.3.2 Commercial/recreational shellfish dredging may impact marine ecosystems by uprooting submerged aquatic vegetation, disrupting substrates, increasing turbidity, and increasing predator species in localized areas.

5.4.3.3 Heavy fishing pressure in localized areas can prevent foraging birds from hunting prime areas decreasing their likelihood of success and reproduction.

5.4.3.6 Fishing gear used by commercial fisheries results in bycatch or entanglement of non-targeted wildlife leading to injury and/or mortality.

5.4.4 Unintentional effects (large scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.4.4.1 Fish introduced for sport fishing can negatively impact native species by competing for resources and/or altering the habitat (e.g., disrupting benthic communities and/or severely impacting aquatic vegetation).

5.4.4.2 Commercial/recreational shellfish dredging may impact marine ecosystems by uprooting submerged aquatic vegetation, disrupting substrates, increasing turbidity, and increasing predator species in localized areas.

5.4.4.3 Heavy fishing pressure in localized areas can prevent foraging birds from hunting prime areas decreasing their likelihood of success and reproduction.

5.4.4.5 Fishing gear used by commercial fisheries results in bycatch or entanglement of non-targeted wildlife leading to injury and/or mortality.

5.4.4.6 Overexploitation of riparian, estuarine, and marine fisheries may deplete food resources required by marine mammals, sea turtles, marine fish and piscivorous birds, in turn resulting lower reproduction and survival.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized) (Avg. Score: 0.33)

NJ Specific Threats:
- 6.1.1.1 Inappropriate use of off-road vehicles creates new roads/trails which fragments habitat.
- 6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.
- 6.1.1.3 Increased risk of harassment that results in a change in wildlife behavior and/or direct mortality from vehicle strikes.
- 6.1.1.4 Increased noise pollution.
- 6.1.1.5 Vehicle use on beaches can cause disturbance, harms breeding and foraging habitats, and can cause direct mortality of beach-nesting birds.
- 6.1.1.6 Off-road vehicles can be a mechanism of transference of wildlife diseases and invasive plant species if gear and apparel are not properly sanitized between sites.

6.1.2 Boating (Avg. Score: 2.83)

NJ Specific Threats:
- 6.1.2.1 Alteration and/or degradation of aquatic habitat.
- 6.1.2.2 Increased disturbance to marine animals and ocean-, bay- and marsh-associated birds which can alter their behavior decreasing the likelihood of their success and/or reproduction.

6.1.3 Use of beaches (Avg. Score: 0.50)

NJ Specific Threats:
- 6.1.3.1 Increases disturbance to beach nesting birds that reduces nesting success, and reduces foraging and resting opportunities for a wide range of nesting and migrating shorebirds.

6.1.5 Wildlife observation and photography (Avg. Score: 1.83)

NJ Specific Threats:
- 6.1.5.1 Improperly conducted recreational activities may disrupt normal wildlife behaviors which can result in reduced reproductive success or survival, abandonment of critical sites, etc.

6.1.7 Other (Avg. Score: 1.00)

NJ Specific Threats:
- 6.1.7.1 Use of recreational or commercial pyrotechnics may cause temporary disturbance to wildlife, in particular to nesting birds.
- 6.1.7.3 Drone use in areas with sensitive wildlife (e.g., nesting and foraging birds, migrating and foraging/feeding whales) can alter their behavior and can cause disturbance that impacts their reproductive and/or foraging success.

6.2 Military Exercises

6.2.1 Military exercises (Avg. Score: 1.00)

NJ Specific Threats:
- 6.2.1.1 Military testing and training exercises may inflict disturbance and potential physical harm to wildlife.
- 6.2.1.3 Lack of opportunity for non-federal wildlife managers to influence activities on military bases may result in detrimental impacts to SGCN and/or missed opportunities to engage in projects that benefit SGCN.

6.3 Work and Other Activities

6.3.1 Unauthorized research projects at significant habitats (Avg. Score: 2.00)

NJ Specific Threats:
- 6.3.1.2 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.
- 6.3.1.3 Activities conducted without proper precautions may disturb and disrupt normal wildlife behaviors, which may impact reproductive success or survival, cause abandonment of critical sites, etc.

6.3.2 Authorized research projects at significant habitats (Avg. Score: 1.00)

NJ Specific Threats: 6.3.2.3 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.2.4 Activities conducted without proper precautions may disturb and disrupt normal wildlife behaviors, which may impact reproductive success or survival, cause abandonment of critical sites, etc.

6.3.3 Other "work" unrelated to research (Avg. Score: 3.00)

NJ Specific Threats: 6.3.3.1 Construction projects may disrupt normal wildlife behavior which can result in reduced reproductive success or survival, abandonment of critical sites, etc. (e.g., bridge-nesting birds).

6.3.3.2 Intensive dune and beach management (including overuse of dune fencing, sand mining, mechanical beach raking, storm clean up), reduces foraging habitat for beach nesting and migratory shorebirds, and poses risks of injury and mortality to unfledged chicks.

6.3.3.3 Beach nourishment projects create suitable habitat for beach-nesting birds in areas of high human use, increasing the likelihood of disturbance to the birds, harm to the eggs, and injury and/or mortality to chicks.

7 Natural Systems Modifications

7.2 Dams and Water Management/Use

7.2.1 Abstraction of Surface Water (domestic use) (Avg. Score: 1.00)

NJ Specific Threats: 7.2.1.6 Impoundments may alter the water levels in high marshes and mudflats, impacting those foraging and nesting habitats.

7.2.2 Abstraction of Surface Water (commercial use) (Avg. Score: 1.00)

NJ Specific Threats: 7.2.2.6 Impoundments may alter the water levels in high marshes and mudflats, impacting those foraging and nesting habitats.

7.2.3 Abstraction of Surface Water (agricultural use) (Avg. Score: 1.00)

NJ Specific Threats: 7.2.3.7 Impoundments may alter the water levels in high marshes and mudflats, impacting those foraging and nesting habitats.

7.2.5 Abstraction of Ground Water (domestic use) (Avg. Score: 1.00)

NJ Specific Threats: 7.2.5.1 Heavy withdrawal of ground water for domestic use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.6 Abstraction of Ground Water (commercial use) (Avg. Score: 1.00)

NJ Specific Threats: 7.2.6.1 Heavy withdrawal of ground water for industrial and commercial use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.7 Abstraction of Ground Water (agricultural use) (Avg. Score: 1.00)

NJ Specific Threats: 7.2.7.1 Heavy withdrawal of ground water for agricultural use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.14 Tidal Water Management (Avg. Score: 1.17)

NJ Specific Threats: 7.2.14.1 Freshwater tidal management for flood control alters water levels and salinity in tidal wetlands.

7.2.14.2 Tidal water management for the purpose of managing for select species may alter existing hydrologic or vegetative conditions to the detriment of other species.

7.2.14.3 Open marsh water management (and other techniques) to control mosquito populations may alter existing hydrologic or vegetative conditions to the detriment of other species.

7.2.14.4 Manipulation of marsh water levels may disturb nesting areas and flood nests.

7.3 Other Ecosystem Modifications

7.3.1 Shoreline Stabilization (Avg. Score: 2.83)

NJ Specific Threats: 7.3.1.1 Efforts to stabilize barrier islands and shorelines, including jetties, groins, bulkheads, interfere with the natural geological processes needed to create and maintain high quality habitat for beach strand species.

7.3.4 Lack of natural disturbance patterns or ecosystem functions due to species loss (Avg. Score: 1.00)

NJ Specific Threats: 7.3.4.4 Human interference in natural processes such as clean up (e.g., beach-filling, shoreline hardening, tree/log removal from forests) after storms, in particular those causing post-hurricane washover and/or barrier island westward movement, and tree felling limits the disturbance needed to maintain appropriate habitats for wildlife.

7.3.5 Poor habitat management (Avg. Score: 3.00)

NJ Specific Threats: 7.3.5.5 Habitat management that alters or removes vegetation without implementing long-term management increases the risk of invasive and exotic plants establishing themselves, outcompeting native vegetation.

7.3.5.6 Habitat management, including that which occurs on public and private lands, that does not consider timing and species' behaviors can result in the direct mortality and/or alteration or loss of habitat.

7.3.5.10 Ditching, draining and filling of marshes and wetlands eliminates habitat and degrades the remaining surrounding areas for wildlife.

7.3.5.11 Salt marsh water management to control mosquitoes may result in negative effects on other species (e.g., changing hydrology of low and high marsh).

7.3.5.13 Private landowners with rare species on their properties are not always cooperative in the protection and management of the species' habitats. Landowners may be held accountable for their actions when they cause harm to the species or destroy the habitat, but it is often too late for the species' population.

7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

7.3.5.16 Lack of proactive management to preserve or maintain viable and functioning marshes for SGCN wildlife.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species (Avg. Score: 3.00)

NJ Specific Threats: 8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.

8.1.1.4 Invasive, non-native animals increase the risk of predation on native animals and/or herbivory on native vegetation.

8.1.1.6 Invasive, non-native plants may create physical barriers for some species.

8.1.4 Invasive non-native terrestrial/wetland animals (Avg. Score: 2.00)

NJ Specific Threats: 8.1.4.2 Free-roaming and feral domestic animals such as cats and dogs causes direct mortality of wildlife and disturbance to wildlife breeding and resting areas.

8.1.5 Invasive non-native terrestrial/wetland plants (Avg. Score: 2.00)

NJ Specific Threats: 8.1.5.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.2 Problematic Native Species/Diseases

8.2.1 Unspecified Species (Avg. Score: 3.00)

NJ Specific Threats: 8.2.1.4 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.2.2 Named Species (Avg. Score: 3.00)

NJ Specific Threats: 8.2.2.2 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.5 Viral/Prion-induced Diseases

8.5.2 Named Species (Disease) (Avg. Score: 1.00)

NJ Specific Threats: 8.5.2.1 Diseases such as West Nile Virus, arenavirus, sudden oak death, Avian Influenza, and snake fungal disease cause morbidity or mortality to native populations.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.1 Domestic and Urban Waste Water

9.1.1 Sewage (Avg. Score: 1.00)

NJ Specific Threats: 9.1.1.1 Degradation of aquatic and marine water quality and habitats by changing turbidity, flow and water chemistry.

9.1.1.2 Leads to increased eutrophication and algae blooms that result in oxygen depletion.

9.1.2 Run-off (Avg. Score: 1.00)

NJ Specific Threats: 9.1.2.2 Contaminants degrade aquatic and marine water quality and can bioaccumulate in benthic organisms, threatening wildlife by causing developmental and behavioral abnormalities and reproductive failure.

9.1.2.3 Contaminants from road runoff (oil, sediment, salt, etc.) impact native vegetation and the species that rely upon them, degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2 Industrial and Military Effluents

9.2.1 Oil Spills (Avg. Score: 1.00)

NJ Specific Threats: 9.2.1.1 Oil spills render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.1.2 Oil spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.1.3 Oil spills cause external oiling of wildlife and ingestion of oil, both of which can injure or kill wildlife.

9.2.3 Other (Avg. Score: 1.00)

NJ Specific Threats: 9.2.3.1 Point and nonpoint source pollution such as polychlorinated biphenyls (PCBs), pesticides, heavy metals, and endocrine disrupting compounds (EDC's) into freshwater and marine systems pose threats to wildlife through direct contact and/or ingestion, and to aquatic species and their predators through bioaccumulation, impacting the reproductive success and neurological function of many avian and fish species.

9.2.3.2 Chemical spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.3.3 Chemical spills may render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.3 Agricultural and Forestry Effluents

9.3.1 Nutrient Loads (Avg. Score: 1.00)

NJ Specific Threats: 9.3.1.2 Animal waste degrades terrestrial and aquatic habitats, especially streams, ponds and wetlands, resulting in eutrophication, which disrupts oxygen and nutrient balances, and causes injury and mortality to aquatic organisms.

9.3.3 Herbicides and Pesticides (Avg. Score: 1.00)

NJ Specific Threats: 9.3.3.1 Pesticides degrade terrestrial and aquatic habitats, especially streams, ponds and wetlands. Aquatic wildlife are particularly sensitive to these contaminants, which can cause developmental and behavioral abnormalities and reproductive failure. Some contaminants may bioaccumulate in predatory fish and birds and disrupt reproduction.

9.3.3.3 Use of pesticides can directly harm non-target species through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture (Avg. Score: 1.00)

NJ Specific Threats: 9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.4 Garbage and Solid Waste

9.4.1 Direct hazards to wildlife (Avg. Score: 2.00)

NJ Specific Threats: 9.4.1.1 Wildlife may ingest garbage causing choking or impingement in the digestive system, or they may become physically entangled in it (e.g., plastic or abandoned fish nets); conditions that make them unable to feed or drink, cause them to suffocate or drown, or otherwise restrict the animal's movement making them more susceptible to predators, starvation or injury.

9.5 Air-Bourne Pollutants

9.5.1 Acid Rain (Avg. Score: 1.00)

NJ Specific Threats: 9.5.1.1 Causes acidification of water bodies, resulting in changes to aquatic and marine communities and reducing biodiversity, and creating conditions that are unsuitable for some aquatic (freshwater and marine) and semi-aquatic species that are sensitive to pH shifts.

9.5.6 Herbicides and Pesticides (Avg. Score: 1.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

9.6 Excess Energy

9.6.1 Light Pollution (Avg. Score: 1.83)

NJ Specific Threats: 9.6.1.1 Artificial lighting can reduce suitability of adjacent habitat for species sensitive to artificial lights by disorienting wildlife, reducing foraging suitability or success, or increasing visibility to predators, resulting in reduced diversity and/or productivity of species in adjacent habitat.

9.6.3 Noise Pollution (Avg. Score: 2.00)

NJ Specific Threats: 9.6.3.1 Acute and chronic noise pollution in and adjacent to terrestrial and aquatic (marine and freshwater) environments could disrupt normal behaviors of wildlife such as migration, communication, feeding, eluding predators, resting and breeding, etc.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 1.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.2 Droughts

11.2.1 Droughts (Avg. Score: 1.00)

NJ Specific Threats: 11.2.1.3 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

11.3 Temperature Extremes

11.3.1 Temperature extremes (Avg. Score: 2.00)

NJ Specific Threats: 11.3.1.1 Increasing temperatures may cause habitat loss and degradation by desiccating and/or raising the temperatures of small wetlands and streams leading to the loss of freshwater mussels and other aquatic species and species reliant upon these habitats.

11.3.1.2 Increased temperatures can negatively impact wetland, riverine, lacustrine and vernal pool-associated or -dependent wildlife by reducing flows, increasing water temperatures, lowering water levels and causing premature drying of vernal habitats.

11.3.1.3 Temperature extremes of surface water and air degrades marine habitats and ecosystems, threatening marine wildlife. Such extremes also disrupt offshore currents and migratory patterns, species' ranges, and/or impact communities/food chains, all of which further impact the ecosystem.

11.3.1.4 Extremely low temperatures and/or extensive periods of unseasonably low temperatures during critical life history stages (e.g., hibernation, gestation/nesting) can alter animals' behaviors and decrease survivorship.

11.4 Storms and Flooding

11.4.1 Storms and flooding (Avg. Score: 3.00)

NJ Specific Threats: 11.4.1.1 Extreme storms and flooding events threaten aquatic and marine wildlife through habitat degradation and alteration, including alterations to off-shore or back-bay benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic and marine wildlife.

11.4.1.2 Potentially damage coastal habitats, including beach- and marsh-nesting bird habitats and interdunal wetlands, and can increase marsh erosion.

11.4.1.6 Increased storms and flooding reduce nesting success, especially for ground-nesting birds.

11.4.1.7 Potentially damage coastal habitats, including beach and marsh habitats used by spawning horseshoe crabs, nesting diamondback terrapins, and resting and foraging birds.

11.4.2 Increased rainfall (Avg. Score: 2.00)

NJ Specific Threats: 11.4.2.1 Extreme rain events threaten aquatic wildlife through habitat degradation and alteration, including alterations to benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic wildlife.

11.4.2.2 Extreme rain events can damage wildlife nesting and resting habitats, including impacts to avian eggs and chick and small mammal survivorship.

11.4.2.3 More frequent rain events can alter terrestrial and wetland vegetation communities as well as wetland hydrology, shifting wildlife community use.

11.6 Phenology Shifting or Alteration

11.6.2 Phenology shifts related to predator-prey ecology (Avg. Score: 2.00)

NJ Specific Threats: 11.6.2.1 Alters inter-specific relationships (e.g., competition, parasitism, predation) of wildlife, ultimately leads to detrimental impacts on the ecological system.

11.6.2.2 Shifts timing of species migration, breeding and hibernation, and available food resources, causes redistribution of species, or mortality for species that are unable to relocate due to their already isolated habitat or limited mobility.

11.6.3 Phenology shifts related to species redistribution (Avg. Score: 1.00)

NJ Specific Threats: 11.6.3.1 Shifts in timing of species migration, breeding and hibernation, and available food resources, as a result of wildlife range shifts driven by climate change.

11.6.3.2 Shifts in nesting times or egg incubation durations can limit nest success and longterm populations.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 2.17)

NJ Specific Threats: 12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.4 Lack of information on the morphometrics and trends of coastal salt marshes and salt marsh islands.

12.1.1.5 Lack of information regarding the SGCN populations that use managed salt marshes and the best techniques for making improvements for marsh-dependent SGCN wildlife.

12.1.1.6 Lack of information regarding migratory pathways and response of wildlife to lights and noise associated with offshore wind turbines.

12.1.2 Lack of up-to-date existing information (Avg. Score: 1.33)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.2.2 Lack of wildlife monitoring at sites with structures that pose high risk of mortality to SGCN wildlife.

12.1.3 Need to answer research question (Avg. Score: 3.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.3.4 Lack of information regarding the potential short- and long-term impacts of wind turbines and other tall coastal structures on migratory populations.

12.1.4 Need to develop new technique (Avg. Score: 2.17)

NJ Specific Threats: 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.

12.1.4.3 Lack of techniques for high marsh preservation that includes impoundments and elevated islands.

12.1.4.4 Lack of consideration of habitat management opportunities in the course of salt marsh management for mosquito control.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 2.00)

NJ Specific Threats: 12.3.0.6 Certain geographic or habitat features, such as vernal pools and headwater wetlands or streams, may be too small, mischaracterized, or misidentified to benefit from regulatory protection.

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 1.00)

NJ Specific Threats:

12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.

12.4.0.6 Techniques for ecological management or restoration of shorelines are not fully developed or evaluated for effectiveness for target and non-target SGCN in coastal areas.

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 3.00)

NJ Specific Threats:

14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 3.00)

NJ Specific Threats:

14.2.1.2 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various aquatic and riparian management practices.

14.2.1.3 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various coastal management practices.

14.2.1.4 Need to develop greater understanding of and support for efforts implemented to maintain disturbance-free habitats that allow coastal wildlife populations to thrive alongside human residential and recreational uses.

14.2.1.5 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various wetland management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 2.00)

NJ Specific Threats:

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.1 Enhance critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates through incentive programs with adjacent private landowners to increase the effective size of the habitat.

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.3 Secure and promote the protection/restoration of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through incentive programs.

1.2.1.6 Secure and promote the protection/restoration of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers through incentive programs.

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.12 Create incentives (non-monetary and/or monetary) for land developers to redevelop abandoned areas (e.g., shopping centers, office complexes) to minimize the loss of natural habitats and reduce the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.14 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of herbicides and pesticides, and implementing more ecologically safe strategies when using such products.

1.2.1.16 Create incentives (non-monetary and/or monetary) within State regulations (mitigations requirements or credit, BMP satisfaction, etc.) to promote the use of retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.17 Develop a public-relations oriented certification program for private retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.18 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and land managers to control and reduce the impacts of invasive, native and non-native species in order to increase structural habitat diversity.

1.2.1.20 Coordinate across government agencies and non-government organizations to create or expand upon tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMP's.

1.2.1.21 Create and/or support market-based programs that subsidize or create branding for products derived sustainably from managed wildlife habitats.

1.2.1.23 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to provide cost shares and/or plan approvals for management based on management approaches and prescriptions.

1.2.1.25 Create incentives (non-monetary and/or monetary) within State regulations to assist and programs to deliver those incentives to aquaculture growers to relocate, for example, from intertidal to subtidal lease areas through buyouts of leases or microloans, and/or promoting on-lease conservation measures used by aquaculture growers (such as the implementation of conservation easements, use of living shorelines, incorporation of BMPs for habitat protection, etc.) for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

1.2.1.27 Create legislation to re-instate incentives for citizens bringing their own shopping bag(s) to grocery stores in an effort to decrease the amount of plastic shopping bags in circulation.

2 Direct Management of Natural Resources

2.1 Create new habitat or natural processes

2.1.1 Habitat conversion

2.1.1.1 Create high marsh habitat through impoundments and diking of low marsh areas that are less susceptible to breaching by storms and sea-level rise.

2.1.1.2 Utilize dredged materials to create marsh islands to provide nesting habitat for birds and marine turtles.

2.6 Hazard or infrastructure removal

2.6.6 Shoreline armoring removal

2.6.6.1 Remove shoreline armoring to reduce its impacts on aquatic habitats.

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.2 Develop, implement, monitor and evaluate pest control/management strategies to reduce the impacts of over-abundant wildlife species (native and/or native, invasive species) on native vegetation and the degradation of habitats supporting SGCN. Over-abundant wildlife species include but are not limited to mute swans, Canada geese, beaver and white-tailed deer.

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.5 Implement biologically safe and appropriate control/management strategies, and where appropriate, eradication strategies to reduce the impacts and/or limit the distribution of invasive and/or non-native plant species within or near aquatic systems using methods that will provide the most protection to the aquatic and riparian ecological system, and minimize disturbance to the soil and wildlife. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.8.0.6 Implement long-term management of invasive and/or non-native plants to help maintain functioning ecological systems and biological diversity, and to enhance travel corridors. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.9 Living shorelines

2.9.1 Beach renourishment

2.9.1.1 Implement best management practices for using mined sand or dredged material to improve habitat for wildlife, particularly for spawning horseshoe crabs and migrating shorebirds.

2.9.1.2 Coordinate the beneficial placement of dredge materials to create, enhance, and/or maintain colonial waterbird nesting, in particular along the Intra-Coastal Waterway.

2.9.2 Erosion control structures

2.9.2.1 Install breakwaters in the form of living shorelines to reduce the impact of wave erosion while preserving the natural character of the site.

2.9.3 Sand dune restoration

2.9.3.2 Implement sand dune restoration strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimizes harm to wildlife, particularly SGCN.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.10 Minimize the loss of important habitats (e.g., coastal scrub-shrub and grassy habitats, high and low marsh habitats, etc.) that provide nesting, migrating, and wintering areas for SGCN birds and other coastal and marsh-dependent species through habitat restoration efforts.

2.10.0.11 Restore and/or enhance critical migratory terrestrial and aquatic habitats (e.g., beach, grasslands, forest, scrub-shrub, etc.) for songbirds, raptors, shorebirds, waterfowl, bats and invertebrates through habitat restoration efforts and expand habitat restoration to adjacent private lands to increase the effective size of the habitat.

2.10.0.12 Create and/or maintain scrub-shrub habitats through revegetation efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.10.0.13 Restore and/or enhance impoundments to provide suitable foraging and nesting habitat for SGCN species inhabiting them (e.g., bitterns, rails, ducks, turtles and some invertebrates).

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.17 Maintain, enhance and/or restore SGCN-inhabited/used freshwater wetlands through restoring submerged aquatic vegetation.

2.10.0.23 Restore and/or enhance roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

2.10.0.26 Reestablish/restore historically important submerged aquatic vegetation beds in Delaware Bay tributaries to benefit SGCN waterfowl, waterbirds, terrapins, sea turtles and finfish.

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through vegetation management.

2.11.0.6 Reclaim degraded rare species habitats by conducting vegetation management needed to restore habitat value for the documented/target SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.8 Maintain, enhance and/or restore biologically appropriate buffers for SGCN-inhabited/used freshwater wetlands through vegetation management.

2.11.0.9 Minimize habitat loss of critical coastal habitats that provide nesting, migrating, and wintering areas for birds and other coastal species by maintaining or enhancing these areas through vegetation management.

2.11.0.13 Implement best management practices (BMPs), protective strategies, and guidelines for vegetation management to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.11.0.16 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.11.0.20 Create and/or maintain scrub-shrub habitats through management efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.11.0.22 Minimize habitat loss of high and low marsh habitats that provide nesting, migrating and wintering areas for SGCN birds and other marsh-dependent SGCN by maintaining or enhancing these areas through habitat management and/or revegetation or restoration efforts.

2.11.0.23 Implement appropriate habitat management actions in areas where natural disturbances, such as wildfire, have been precluded.

2.11.0.30 Identify and prioritize areas where various management tools (such as increasing salinity through the management of water levels or chemical applications) may be effective in reducing phragmites within and restoring marsh habitat.

2.11.0.33 Increase structural habitat diversity by implementing long-term vegetation management to minimize the potential for the establishment of invasive and/or non-native plants that may outcompete native vegetation.

2.11.0.35 Increase structural habitat diversity by managing vegetation adjacent to aquatic habitats in a manner that provides a buffer from runoff and erosion and a microclimate to stabilize seasonal temperatures to benefit a variety of aquatic and semi-aquatic species.

2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.

2.11.0.41 Increase structural habitat diversity through the implementation of a variety of vegetation management practices such a prescribed burns (either increasing or decreasing their frequency depending on the site and objective), plantings, etc. that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.44 Manage phragmites adjacent to coastal marshes of interest, in particular those that are within underdeveloped areas and are unprotected, through herbicide application and water management to improve resiliency of the marshes to sea level rise.

2.12 Water management

2.12.1 Ditch plugs

2.12.1.1 Implement best management practices (BMPs), protective strategies, and guidelines for ditch plugging to maintain and enhance healthy, resident and migratory SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.12.2 Diversion/headgate

2.12.2.1 Prevent or ameliorate near-term impacts of climate change throughout the State but in particular within the coastal and Delaware Bay areas by implementing habitat management strategies that will establish/improve habitat resilience, such as using diversions, that benefits wildlife inhabiting these areas.

2.12.3 Drainage

2.12.3.3 Remove tile drains and drainage ditches to improve wetland hydrology and restore natural stream flows during appropriate times to avoid sensitive periods (e.g., nesting, denning, roosting) and minimizes harm to wildlife, particularly SGCN.

2.12.3.4 Expand the acreages and enhance the effective size of SGCN habitats by reclaiming/restoring adjacent, degraded habitats by removing tile drains and drainage ditches.

2.12.3.6 Protect significant natural and/or unique communities by and when removing tile drains and drainage ditches.

2.12.3.7 Minimize habitat loss of critical coastal habitats that provide nesting, migrating, and wintering areas for birds and other coastal species by maintaining or enhancing these areas by removing drainage ditches.

2.12.3.9 Implement drain removal on state and other conservation lands to enhance food availability for migratory species (birds, bats, invertebrates).

2.12.3.11 Implement best management practices (BMPs), protective strategies, and guidelines when removing tile drains and drainage ditches to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.12.6 Tide gate

2.12.6.1 Prevent or ameliorate near-term impacts of climate change throughout the State but in particular within the coastal and Delaware Bay areas by implementing habitat management strategies that will establish/improve habitat resilience, such as tide gates, that benefits wildlife inhabiting these areas.

2.12.7 Waterfowl impoundment maintenance

2.12.7.1 Manage impoundments to benefit SGCN species inhabiting them (e.g., bitterns, rails, ducks, turtles and some invertebrates).

2.12.7.2 Use impoundment management to create feeding and roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

2.12.7.3 Implement best management practices (BMPs), protective strategies, and guidelines for impoundment management to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.12.7.4 Implement impoundment management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimizes harm to wildlife, particularly SGCN.

2.12.7.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through impoundment management.

2.12.7.6 Reclaim degraded rare species habitats through impoundment management needed to restore habitat value for the documented/target SGCN.

2.12.7.7 Protect significant natural and/or unique communities by implementing best management practices for impoundment management.

2.12.7.8 Repair impoundments damaged by salt hay farm/dike abandonment and conduct restoration of degraded sites for targeted SGCN species and their habitats.

2.12.7.9 Minimize habitat loss of critical coastal habitats in Delaware Bay that provide nesting, migrating, and wintering areas for birds and other coastal species by maintaining or enhancing these areas through impoundment management.

2.12.7.11 Restore existing salt hay farm areas by repairing breaches in impoundments to create habitat for high marsh nesting species and waterfowl.

2.12.7.14 Prevent or ameliorate near-term impacts of climate change throughout the State but in particular within the coastal and Delaware Bay areas by implementing habitat management strategies that will establish/improve habitat resilience, such as impoundment management, that benefits wildlife inhabiting these areas.

2.12.7.15 Implement impoundment management on state and other conservation lands to enhance food availability for migratory species (birds, bats, invertebrates).

2.12.8 Watering facilities

2.12.8.1 Install water control structures to reduce the impact of excessive salt water flooding to particularly vulnerable high marsh habitats.

2.12.8.2 Manage water levels in impoundments to improve coastal marsh habitat availability to wildlife and improve resiliency of the marshes to sea level rise.

2.13 Wildlife damage management

2.13.0 Nuisance fish and wildlife damage

2.13.0.3 Investigate alternative saltmarsh mosquito control methods that may produce benefits for coastal marsh dependent SGCN wildlife, including but not limited to high-marsh nesting birds and migrating shorebirds and landbirds.

2.13.0.5 Investigate the impacts of human-subsidized and/or naturally occurring predator species on SGCN to assess the need for integrated wildlife damage management techniques (e.g., predator exclosures, fish blockages, electric fence, culls) and/or policy changes on state land management that minimize the impacts of human-subsidized predators.

2.13.0.8 Implement and assess management strategies to control and reduce the impacts of detrimental species and diseases that pose threats to native wildlife or communities.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.6 Conduct long-term studies on resident and migratory SGCN to determine if there are changes to the populations' demography (productivity, survival, dispersal) and/or to their critical and/or supporting habitats (i.e., diminishing in value, acreage or connectivity, etc.), in particular changes that would not maintain SGCN at viable levels for species populations. Update data and GIS maps; provide updated information to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.9 Identify SGCN (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources, and compile/collect and evaluate data/information regarding potential management strategies to improve the availability of such SGCN's food resources.

3.0.0.10 Conduct long-term studies to evaluate the effectiveness of management strategies implemented to enhance food/prey availability for SGCN [whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources] through studies that investigate the populations and health of the food resources as well as the target SGCN. Revise management strategies as needed and continue to monitor the effectiveness of the efforts.

3.0.0.11 Develop, implement and evaluate the effectiveness of town plans that avoid impacts to SGCN species and their habitats.

3.0.0.14 Identify areas with invasive, aquatic plants and animals and collect a detailed baseline assessment of the species' status and distribution. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort. Researchers and contractors performing Forest Stewardship Inventories and/or Plans on state lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.0.0.15 Conduct long-term monitoring of areas identified as having invasive, aquatic plants and animals to track the species' status/progress over time with or without the implementation of management strategies. Areas without management strategies should be assessed and prioritized for management/control. Areas where management strategies are being implemented should include an assessment of the management effort and identify/recommend and implement necessary changes to improve its success. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort.

3.0.0.16 Develop a baseline status (through studies and assessments, review of available data, enlistment of species experts, etc.) of marsh- and beach-dependent SGCN (and their habitats) whose populations may be impaired due to habitat degradation as a result of salt hay farm/dike abandonment.

3.0.0.17 Conduct long-term monitoring of marsh- and beach-dependent SGCN (and their habitats) to evaluate the effectiveness of the management strategies implemented to repair degraded marshes and beaches damaged by salt hay farm/dike abandonment within all bay shore areas.

3.0.0.21 Conduct long-term monitoring to determine the impacts of the fish and shellfish aquaculture industries on focal and non-focal SGCN and their habitats (i.e., NJ bays, estuaries, ocean areas). Assess the success of management actions implemented to minimize these impacts and make specific recommendations to the NJ DEP regarding how such management efforts may be improved to minimize harm to wildlife and their habitats.

3.0.0.25 Identify pathways of migratory SGCN in the Atlantic Coastal and Marine Regions (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and use the data to help evaluate the potential short- and long-term impacts of wind turbines, radio towers, utility guy lines, and other tall coastal structures on migratory populations.

3.0.0.28 Evaluate best management practices for using mined sand or dredged material to improve habitat for wildlife, particularly for spawning horseshoe crabs and migrating shorebirds.

3.0.0.30 Conduct research to investigate the feasibility of managing and/or creating roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

3.0.0.31 Conduct short- and long-term studies (e.g., wildlife surveys and habitat assessments) to evaluate the effectiveness of vegetation management efforts to maintain, enhance and/or create roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.2 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.0.5 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

3.2.0.8 Implement and conduct long-term monitoring of control measures aimed at minimizing the impacts of problematic species and/or diseases to evaluate the effectiveness of such efforts and to identify and incorporate additional strategies as appropriate.

3.2.0.17 Conduct monitoring at constructed wind farms (within or outside of NJ) to assess the impacts on migratory species (birds, bats, insects) and determine if NJ's land use planning efforts and/or smart-growth plans need to be revised.

3.2.0.19 Develop, implement and evaluate aquaculture practices in coastal areas that are compatible with the recovery of SGCNs and industry needs.

3.2.0.20 Evaluate the effectiveness of BMPs for mosquito control methods that may produce benefits for coastal marsh dependent SGCN wildlife, including but not limited to high-marsh nesting birds and migrating shorebirds and landbirds.

3.2.0.24 Develop, implement and evaluate the effectiveness of BMPs for lighting of/on tall structures that minimize harm to and/or disorient wildlife, in particular but not limited to migratory birds, bats and invertebrates. Implement BMPs into state, county and local permitting processes.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.2 Age, size and sex structure

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.3 Baseline inventory

3.2.3.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) suitable areas for marine conservation zone designation and promote policies and regulations that support the designation of such areas.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.3 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) remaining high and low marsh habitats with natural buffers and stable water levels that provide suitable habitat for SGCN and marsh habitats that would benefit from restoration. Conduct research to assess their condition for nesting, migrating and wintering birds.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.11 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the quality and importance of areas with submerged aquatic vegetation to benefit waterfowl, finfish, and shellfish species.

3.3.1.14 Compile information (obtained through literature reviews, communication with other States along the Atlantic coast, academia, etc.) regarding the impacts of above water operation of wind turbines on migratory marine birds and bats. Provide data to appropriate governing agencies and/or State commissions for integration into permitting review processes.

3.3.1.16 Gather "best information" for spatial modeling and update/create a current model/depiction of anticipated habitat shifts from sea-level rise, flooding, etc.

3.3.1.18 Conduct an assessment using available data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels.

3.3.1.19 Identify and codify legal ORV access areas on state (and if appropriate, other conserved) lands. Provide GIS mapping to the landowner for potential use in directing such recreational activities.

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.1.21 Conduct comprehensive baseline surveys of all marsh islands; surveys to include, but are not limited to, documented elevations, and assessments of the habitat's current condition and vulnerability of dependent SGCN species in relation to the increased inundation rate.

3.3.1.22 Identify, assess and prioritize marsh habitats for restoration where various management tools (such as increasing salinity through the management of water levels or chemical applications) may be effective in reducing the presence of phragmites.

3.3.1.23 Identify areas (through surveys/studies, predictive modeling, review of available data, enlistment of habitat management and/or species experts, etc.) where the State can allow coastal marsh migration due to sea level rise, and target these areas for land acquisition and/or land management to accommodate this transition. Targeted areas should include underdeveloped areas adjacent to unprotected coastal marshes.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.1.28 Identify key habitats for the potential allowance of natural coastal processes without interfering through shoreline stabilization, etc. and evaluate the risks and benefits if coastal migration was permitted to occur naturally. Create a GIS map of the identified areas; provide the assessment and mapping to local towns and other appropriate governing agencies.

3.3.1.29 Identify coastal wildlife habitats unimpacted by development and/or at greatest risk of habitat loss to help guide enlightened coastal stabilization efforts (i.e., use of soft stabilization) to reduce the impacts on wildlife and their habitats.

3.3.2 Monitoring

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.6 Investigate the effectiveness and potential impacts of marsh management techniques by studying the effects of Open Marsh Water Management on wildlife species, in particular high marsh nesting birds and waterfowl. Evaluate best management practices as appropriate.

3.3.2.7 Conduct studies on land use practices such as ditching, impounding, dredging, open marsh water management, burning, and marsh restoration to evaluate the effectiveness and potential impacts on marsh-dependent SGCN.

3.3.2.10 Evaluate the efficacy and success of different management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.3.2.15 Investigate the effectiveness of management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.3.2.19 Once baseline data on the marsh islands' and associated SGCN species' vulnerability to inundation is completed, continue to conduct long-term monitoring the islands to determine sustainability for wildlife dependent on these areas.

3.3.2.20 Once a system is developed for reporting and qualifying new locations of invasive species, develop, implement and monitor/evaluate invasive species removal strategies at identified locations. Priority should be given to those areas critical to SGCN and/or contain unique and/or rare plant communities supporting SGCN and/or other fish/wildlife species.

3.3.2.21 Develop, implement and evaluate the effectiveness of management strategies use to restore marsh habitat (e.g., phragmites reduction).

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.2 Develop management strategies to improve the availability of prey/food resources for SGCN whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources. Monitor and investigate the management strategies over time to determine success and/or the need to revise methods.

3.5.3.4 Modify best management practices of Open Marsh Water Management based on evaluation of the effectiveness and potential impacts of marsh management techniques on wildlife species, in particular high marsh nesting birds and waterfowl.

3.5.3.5 Develop best management practices for using mined sand or dredged material to improve habitat for wildlife, particularly for spawning horseshoe crabs and migrating shorebirds.

3.5.3.6 Develop/improve management strategies to repair marshes and associated beaches damaged by salt hay farm/dike abandonment for all bay shore areas currently degraded.

3.5.3.8 Develop best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.13 Developing engineering standards that embrace both shore protection/resiliency and habitat creation for shorebirds, horseshoe crabs and other coastal species along the Atlantic and Delaware Bay coasts.

3.5.3.14 Develop aquaculture practices in the coastal areas that are compatible with the recovery of SGCN.

3.5.3.16 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.3.17 Investigate and improve marsh management techniques to benefit critical wildlife species, in particular high marsh nesting birds and waterfowl.

3.5.3.18 Develop recommendations to improve methods on land use practices such as ditching, impounding, dredging, open marsh water management, burning, and marsh restoration based on potential impacts on marsh-dependent SGCN.

3.5.3.21 Develop management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.24 Based on research, modify management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.1 Develop studies to evaluate management strategies to improve the availability of prey/food resources for SGCN whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources. Monitor and investigate the management strategies over time to determine success and/or the need to revise methods.

3.5.4.3 Investigate alternative saltmarsh mosquito control methods that may produce benefits for coastal marsh dependent SGCN wildlife, including but not limited to high-marsh nesting birds and migrating shorebirds and landbirds.

3.5.4.10 Develop BMPs for lighting of/on tall structures that minimize harm to and/or disorientation of wildlife, in particular but not limited to migratory birds, bats and invertebrates.

3.5.4.13 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.4.14 Develop and implement agreements, and update existing agreements, with government agencies regarding the protection of critical SGCN habitats (e.g., significant breeding populations of beach nesting birds, colonial waterbird nesting areas, bat colonies, etc.).

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.17 Investigate new, non-invasive techniques for SGCN population evaluation through literature review, expert opinion, trial studies (if low risk), etc.

3.5.4.18 Investigate the effectiveness of survey techniques through selected "ground truthing" and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

4 Education

4.1 Educator/Instructor training

4.1.1 Aquatic resource education

4.1.1.1 Provide educational resources and training programs to teachers in aquatic resource education that includes information regarding climate change and sea-level rise for incorporation into the class curriculum and/or as the focus of school field trips.

4.1.1.2 Provide educational resources and training programs to teachers in aquatic resource education that includes information regarding how coastal stabilization negatively impacts wildlife by preventing natural processes for incorporation into the class curriculum and/or as the focus of school field trips.

5 Facilities and Areas

5.15 Wildlife Management Areas

5.15.6 Roads

5.15.6.1 Clearly post areas/roads where vehicle access is permitted.

5.15.6.2 Clearly post areas/trails where vehicle access is not permitted.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.1 Enhance and increase the effective size of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates by securing adjacent habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.3 Secure and protect riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.5 Secure and protect critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.8 Secure and protect scrub-shrub habitats for SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.1 Land acquisition

6.1.1 Fee title

6.1.1.1 Use state, federal, and local land acquisition programs (e.g., Green Acres, Blue Acres, etc.) to acquire abandoned or failing bay shore communities and to relocate displaced people and infrastructure.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.1 Promote the protection of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates and enhance these lands by increasing the effective size through conservation area designations of stopover habitats and adjacent private lands.

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.3 Increase the protection of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through conservation area designations.

6.3.0.5 Promote the protection of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through conservation area designations.

6.3.0.8 Promote the protection of scrub-shrub habitats for SGCN through conservation area designations.

6.3.0.9 Promote the protection of critical marine habitats for SGCN through conservation area designations.

7 Law Enforcement

7.1 Law enforcement

7.1.2 National Level

7.1.2.1 Enforce regulations to protect nesting bird colonies from human disturbance.

7.1.3 Sub-national Level

7.1.3.1 Enforce slow wake zones and marine conservation area regulations to protect aquatic vegetation.

7.1.3.2 Increase the number of law enforcement officers tending to wildlife issues to a reasonable number to sufficiently cover the State and marine waters.

7.1.4 Scale Unspecified

7.1.4.1 Improve enforcement of policies and/or regulations that promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

7.1.4.2 Restrict human activity from staging areas for red knots and other migratory shorebirds through increasing law enforcement presence.

7.1.4.3 Increase law enforcement presence proximate to sensitive areas [e.g., avian nesting sites, in particular rookeries, and reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively)] to deter human activity and subsequent disturbance to SGCN.

7.1.4.4 Improve enforcement of policies/regulations aimed at protecting and preserving critical coastal and marsh habitats, and secure mitigation for losses that create an environmental benefit.

7.1.4.5 Enforce current policies and/or regulations to increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal SGCN, and implement and enforce amended policies/regulations.

7.1.4.6 Recruit law enforcement to assist in the protection and enhancement of SGCN populations, in particular endangered species, through improved awareness of species through trainings, partnerships, and other methods. Information should include but is not limited to: 1) Issues concerning illegal collection of reptiles, 2) Persecution of rare snakes, 3) Illegal recreational activities on public lands (e.g., off-road vehicles) and their impact on wildlife, 4) Identification of sensitive areas, critical sites and/or "hot-spots" for collection.

7.1.4.7 Increase law enforcement presence to enforce regulations governing recreational activities (e.g., the use of personal watercraft and off road vehicles, caving, rock climbing, etc.) on conserved lands and within other sensitive habitats, and discourage activities that cause harm or disturbance to vegetation, wetlands, fish and wildlife.

7.1.4.8 Implement policies that protect critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates.

7.1.4.9 Implement policies that improve and secure habitat connections between conserved SGCN habitats.

7.1.4.10 Implement policies that promotes expanding acreages and enhances the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

7.1.4.11 Implement and enforce policies/regulations that will increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.16 Implement policies that protect and restore riparian areas.

7.1.4.17 Improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

7.1.4.18 Increase law enforcement presence at important nesting areas on marsh islands to increase the likelihood of boat users acting in a manner that reduces disturbance to birds.

7.1.4.19 Implement policies that protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

7.1.4.21 Implement regulations for lighting of/on tall structures that will minimize harm to and/or disorientation of wildlife, and enforce within state, county and local permitting processes.

7.1.4.22 Implement policies and/or regulations that prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

7.1.4.25 Encourage the enforcement of municipal laws regulating domestic pets that may predate on wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.2 Develop a team of personnel from government entities, conservation organizations and other stakeholders engaged in oil/gas spill response for marine and freshwater habitats to develop a feasible plan for oil spill response and/or to amend NJ's current oil spill response plan that clearly outlines each organizations responsibilities and an assessment and location list of available equipment for boom deployment during oil spills.

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.1.0.4 Engage government agencies, conservation partners and other stakeholders in constructive dialogues encouraging them to influence policy change and the creation of incentives through a habitat bill and/or municipal ordinances for backyard habitat.

8.1.0.6 Engage government agencies, conservation partners and other stakeholders in discussions focused on sharing information regarding coastal and marine critical wildlife habitats, developing comprehensive mapping to assist in reducing impacts of energy production activities, and establishing a long-term monitoring program to update the data. Ensure this information is available to appropriate personnel for planning or response measures.

8.1.0.7 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting coastal boating and recreation communities about eelgrass/widgeongrass, their impacts on marine environments, and the value, fragility and location of submerged aquatic vegetation beds and habitats.

8.1.0.16 Engage local governments in discussions regarding the importance of them adopting/passing ordinances which require assessing and addressing secondary impacts (i.e., ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.21 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation human-subsidized and/or overabundant, native species cause to local nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.22 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation invasive species cause to native nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.33 Engage government agencies, conservation partners and other land managers, communities, landowners, and commercial and industrial stakeholders in discussions regarding the importance of protecting and methods to protect priority wetlands beyond the levels afforded through regulation by maintaining and/or restoring optimal biological buffers around wetlands.

8.1.0.34 Work with the NJ Education Association and Department of Education to design curriculum and outdoor experimental learning opportunities, and provide training to teachers on implementation of these activities.

8.1.0.37 Enlist landowners and NJ citizens in the protection of and survey efforts for SGCN, in particular rare species, by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management and wildlife-related volunteer programs.

8.1.0.39 Deploy stewards at active nesting areas to work with and educate the public on how to reduce disturbance to birds.

8.1.0.40 Encourage researchers, land managers, naturalists and enthusiasts to follow proper procedures for the coordination and/or permitting of research/management activities involving wildlife and sensitive habitats, and discourage activities that alter vegetation or wetlands, or cause harm or disturbance to wildlife.

8.1.0.42 Engage citizens, wildlife observers and photographers through discussions and distributable information regarding the importance of and encouraging implementing responsible and ethical behavior when observing wildlife by developing an alliance of wildlife photographers and widely circulating recommendations on how to reduce impact.

8.1.0.46 Form cooperative partnerships with dredging companies to facilitate habitat creation and enhancement within project areas, and to identify seasonal timing of activities that would minimize impacts to wildlife and their habitats.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.1.0.48 Form cooperative partnerships with transportation and shipment agencies and companies to facilitate habitat creation and enhancement away from and outside of project areas and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.2 Recruitment and retention activities

8.2.3 For wildlife watching

8.2.3.1 Develop and implement nature-focused tourism opportunities including wildlife viewing sites, interpretive signage highlighting unique ecosystems/habitats, and wildlife-related recreational opportunities that do not negatively impact SGCN or their habitats.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.6 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners, land managers and local communities to discourage the presence of managed cat colonies and trap, neuter and release programs in wildlife habitats.

8.3.0.7 Develop and provide (or otherwise make publicly available) educational programs and/or materials that describe the negative impacts of off-road vehicles and watercraft use in and adjacent to critical SGCN habitats, and the importance of confining such activities to more appropriate locations and/or seasons.

8.3.0.8 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate recreationists and encourage landowners to eliminate garbage in the vicinity of suitable wildlife habitat, in particular SGCN habitat. Information should include the detrimental impacts garbage may have on various wildlife species.

8.3.0.9 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners and land managers to include only native plants in landscaping and restoration projects. Provide information to assist them in detecting problematic establishment of invasive, non-indigenous plants.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.15 Develop an educational outreach program for citizens regarding: 1) The impacts to wildlife as a result of plastic bags entering aquatic and marine systems, 2) The importance of decreasing the amount of plastic shopping bags in circulation, 3) The need for businesses to voluntarily charge for bags or reimburse people for using their own non-plastic bags, and 4) The need for their assistance through public pressure on legislators and government to pass legislation that that limits the amount of plastic shopping bags in circulation.

8.3.0.19 Develop an educational outreach program for the public on the devastating effects predators can have on native nesting wildlife.

8.3.0.21 Develop an educational outreach program for the general public, in particular those within and adjacent to coastal and riparian areas on the realities of sea-level rise to help citizens living in these areas understand how this will affect them, how coastal stabilization negatively impacts wildlife by preventing natural processes, and how their decisions impact species.

8.3.0.22 Post signage in sensitive coastal habitats (e.g., bird and Diamondback Terrapin nesting areas) to educate the boating community on responsible use of these areas.

8.3.0.23 Develop an educational outreach program for coastal municipalities and residents to promote an understanding of the benefits of soft structures over hard structures for shoreline stabilization.

8.3.0.25 Develop educational outreach programs for landowners, nurseries and the general public regarding the negative impacts of invasive and non-native plants on our natural communities.

8.3.0.27 Develop educational outreach programs for public and private landowners and land managers regarding the importance of structural habitat diversity, methods to increase diversity, and/or incentive programs available to increase habitat diversity.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.8 Develop a plan that focuses on strategies for oil pipelines to avoid sensitive habitats that would be highly impacted by oil spills.

9.1.0.12 Develop a plan to avoid freshwater tidal management.

9.1.0.15 Develop a plan to minimize fragmentation of terrestrial and aquatic habitats by roads.

9.1.0.18 Develop a plan to minimize the effects of road widening and traffic volume increases within critical wildlife habitat areas using CHANJ products.

9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.26 Develop a plan to minimize any adverse impacts of aquaculture farming techniques and structures on freshwater and intertidal habitats.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.31 Develop wetland restoration plans that consider the life history and needs of wildlife occupying targeted habitats.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.2 Organizational strategic and CMS planning

9.2.1 Organizational strategic and operational planning

9.2.1.1 Identify and codify legal ORV access areas on state lands.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.2 Develop a management plan to improve the availability of prey/food resources for SGCN whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources.

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.6 Amend NJ's current oil spill response plan to 1) expand the geographic area addressed, 2) expand the targeted species impacted and in need of recovery, and 3) revise current and integrate new actions into the plan as needed.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.15 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.1.17 Evaluate the potential benefits to high marsh species (such as Black Rail and Northern Harrier) by restoring salt hay farms along Delaware Bay.

9.3.2 Listed species recovery planning

9.3.2.1 Develop proactive species recovery plans for all endangered and threatened species including guidance and objectives pertaining to critical and supporting habitat to meet and maintain recovery goals.

9.3.3 Habitat management planning

9.3.3.1 Develop a management plan to improve the availability of prey/food resources for SGCN whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources.

9.3.3.2 Develop a management plan for using mined sand or dredged material to improve habitat for wildlife, particularly for spawning horseshoe crabs and migrating shorebirds.

9.3.3.4 Create habitat restoration plans to repair marshes and associated beaches damaged by salt hay farm/dike abandonment for all bay shore areas currently degraded.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.3.12 Develop a management plan using engineering standards that embrace both shore protection/resiliency and habitat creation for shorebirds, horseshoe crabs and other coastal species along the Atlantic and Delaware Bay coasts.

9.3.3.13 Develop a management plan that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas and prevents or ameliorates near-term impacts of climate change throughout the State, but in particular within the coastal and Delaware Bay areas.

9.3.3.16 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.20 Develop an action plan for immediate implementation should habitat levels fall below the minimum necessary size and/or structure within the Cape May Peninsula to sustain the avian migration.

9.3.3.24 Develop a plan to improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

9.3.3.25 Develop a habitat management plan focused on areas important to near-shore, coastal species (e.g., herring, sturgeon, terrapin, nesting birds) that prioritizes these areas to direct resources to minimize the impacts of sea-level rise, flooding and storms (including extreme rain events) such as increased erosion of beach, mudflat and marsh habitats, and the increased risk of saltwater intrusion into freshwater habitats. Gather "best information" for spatial modeling of anticipated habitat shifts from sea-level rise, flooding, etc.

9.3.3.28 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.3.29 Develop habitat management plans aimed at reducing or eliminating negative impacts of ORVs.

9.3.3.31 Using data from baseline inventory and monitoring of all current marsh islands and their vulnerability to inundation as a result of sea level rise, create a plan to delineate each island's ideal fit for habitat management (e.g., restoration, hasting, dredging). Planning will factor in criteria to designate which islands should be maintained or restored, and which will be passively allowed to submerge.

9.3.3.33 Evaluate the potential benefits to increasing high marsh habitat by restoring salt hay farms along Delaware Bay.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.3 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.6 Review all projects to be conducted in or adjacent to coastal wetlands and marshes, and provide recommendations on how to best avoid or reduce human disturbance at nesting areas (for example, timing restrictions) and actions not permitted.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.9 Review strategies for creating or enhancing connectivity (e.g., installing appropriately-sized wildlife passages) between wetlands to allow wildlife to disperse naturally and safely.

11.1.1.12 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed solar farm projects to reduce habitat fragmentation and minimize impacts on wildlife.

11.1.1.13 Use the best available science (species data, habitat present, wind farm layout options, wind blade impacts on migratory species, location of migration routes, etc.) when conducting regulatory reviews of proposed wind farm projects to minimize impacts on migratory and resident wildlife and reduce habitat fragmentation.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.2.2 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.2.4 Review strategies for creating or enhancing connectivity (e.g., installing appropriately-sized wildlife passages) between wetlands to allow wildlife to disperse naturally and safely.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.2 Provide technical support to public and private landowners and land managers for controlling invasive, native and non-native plant species in order to increase structural habitat diversity.

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.15 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and landowners about the importance of retaining and in an effort to protect, create, enhance and/or restore vegetation along aquatic habitats.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.0.27 Provide educational resources and presentations to coastal municipalities and residents to promote the understanding of the benefits of soft structures over hard structures for shoreline stabilization.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.1 Engage partners and stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.4 Provide educational resources, training programs, and on-the-ground guidance to dredging companies and resource managers on habitat creation and enhancement away from and outside of shipping lanes, and to identify seasonal timing of activities that would minimize impacts to wildlife and their habitats.

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

100 Law and Policy

100. Legislation

100.1.3 Sub-national Level

100.1.3.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.3.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.4 County and Local

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.13 Encourage municipal laws regulating domestic pets that may predate on wildlife.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.5.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100.1.5.5 Develop legislation to provide financial support for the New Jersey Invasive Species Strike Team.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.1 Develop (and/or improve) policies and/or regulations that will promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

100.3.0.2 Improve policies/regulations aimed at protecting and preserving critical coastal and marsh habitats and securing mitigation for losses that create an environmental benefit.

100.3.0.3 Develop policies that will promote the long term protection of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates.

100.3.0.4 Promote policies and regulations that support marine conservation zone designations in suitable areas identified through research and literature.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.7 Amend current policies and/or regulations to increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.13 Develop policies that will promote protecting and restoring riparian areas.

100.3.0.14 Develop policies and/or regulations that increase the protective buffers of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) to biologically appropriate distances to benefit SGCN that rely upon these habitats and improve the function of the [associated] aquatic systems.

100.3.0.15 Develop policies that promote protecting and restoring scrub-shrub habitats to benefit shrub-dependent SGCN.

100.3.0.16 Create regulations that restrict human activity from staging areas for red knots and other migratory shorebirds.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.19 Develop regulations for lighting of/on tall structures that will minimize harm to and/or disorientation of wildlife, in particular but not limited to migratory birds, bats and invertebrates. Implement BMPs into state, county and local permitting processes.

100.3.0.20 Develop policies and/or regulations that prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

100.3.0.23 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.36 Create legislation to limit the amount of plastic from shopping bags in circulation and re-instate incentives for citizens bringing their own shopping bag to grocery store.

100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.

100.3.0.42 Fully adopt the former Storm water Management Rules' 300ft buffer requirements into the Flood Hazard Area Control Act Rules.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.47 Investigate regulatory options available to direct the location of aquaculture activities in Aquaculture Development Zone 4 (Delaware Bay area) in a manner which minimizes the loss of wildlife habitats and adverse impacts to the environment.

100.3.0.49 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address the issue of disturbance to habitat or species as a result of human activities (e.g., construction, bridge maintenance, road work, etc.).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.56 Develop regulations that when implemented will protect critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates.

100.3.0.57 Develop regulations that when implemented will improve and secure habitat connections between conserved SGCN habitats.

100.3.0.58 Develop regulations that when implemented will promote the expansion of acreages and enhancement of the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.59 Develop regulations that when implemented will increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.64 Develop regulations that when implemented will protect and restore riparian areas.

100.3.0.65 Develop regulations that when implemented will protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

100.3.0.67 Develop regulations for lighting of/on tall structures that will minimize harm to and/or disorientation of wildlife, and enforce within state, county and local permitting processes.

100.3.0.68 Develop regulations that when implemented will prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100.3.2 State Land Acquisition Programs

100.3.2.1 Increase opportunities for habitat restoration by making any necessary policy changes to state, federal and local land acquisition programs (e.g., Green Acres, Blue Acres, etc.) to allow for acquisition within abandoned or failing bay shore communities, including mechanisms to relocate displaced people and infrastructure.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.2 Create a policy that requires the NJ DEP to incorporate scientific information regarding climate change and sea level rise (e.g., predictions, habitat management/acquisition efforts to enhance resilience to inundation) on their websites and to work with other government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

100.4.0.16 Develop policies to implement habitat management strategies that will increase the structural diversity surrounding areas used for energy, mining, and transportation and service corridors which include but are not limited to the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-

100.4.0.17 Develop policies to implement habitat management strategies, including prescribed burns, that will increase the structural diversity on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies to control and reduce the impacts of invasive, non-native species in order to increase structural habitat diversity.

100.4.0.18 Develop policies to minimize the extent of infrastructure associated with energy and service corridors or areas (e.g., wind and solar farms, pipelines, utility lines) and that require the implementation of habitat management strategies that will increase the structural diversity in the area including (e.g., the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides).

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.24 Develop policies to provide financial support for the New Jersey Invasive Species Strike Team.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Migrant Shorebirds

Focal species that comprise this Conservation Target:

Red Knot Ruddy Turnstone

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.2 Commercial and Industrial Areas

1.2.2 Commercial development using materials that cause collision hazards (Avg. Score: 2.00)

NJ Specific Threats: 1.2.2.1 Collision risk to volant species (birds, bats and invertebrates).

2 Agriculture and Aquaculture

2.4 Marine and Freshwater Aquaculture

2.4.1 Subsistence/Artisinal Aquaculture (Avg. Score: 2.00)

NJ Specific Threats: 2.4.1.1 May degrade freshwater and intertidal habitat due to farming techniques and damage from associated structures.

2.4.1.3 Potential for increased nutrient and effluent loads.

2.4.1.4 Potential increased noise pollution.

2.4.1.5 Increased risk of persistent human disturbance from tending activities that hinder or preclude habitat use by SGCN.

2.4.1.6 Potential for aquaculture structures to create impingement/entanglement hazard and/or preclude benthic habitat use by SGCN.

2.4.2 Industrial Aquaculture (Avg. Score: 2.00)

NJ Specific Threats: 2.4.2.1 May degrade freshwater and intertidal habitat due to farming techniques and damage from associated structures.

2.4.2.3 Potential for increased nutrient and effluent loads.

2.4.2.4 Potential increased noise pollution.

2.4.2.5 Increased risk of persistent human disturbance from tending activities that hinder or preclude habitat use by SGCN.

2.4.2.6 Potential for aquaculture structures to create impingement/entanglement hazard and/or preclude benthic habitat use by SGCN.

3 Energy Production and Mining

3.1 Oil and Gas Facilities and Pipelines

3.1.1 Distribution processes of petroleum and other liquid hydrocarbons (Avg. Score: 1.00)

NJ Specific Threats: 3.1.1.2 Loss, alteration and/or degradation of habitat.

3.1.1.3 Increased risk of oil spills.

3.1.1.4 Increased noise pollution.

3.2 Mining and Quarrying

3.2.4 Sand Dredging (outside shipping lanes) (Avg. Score: 1.00)

NJ Specific Threats: 3.2.4.3 Potential for direct mortality of benthic organisms.

3.3 Renewable Energy

3.3.1 Wind Power (Avg. Score: 2.00)

NJ Specific Threats: 3.3.1.1 Turbines, blades, and structure foundations create a collision risk to volant species (birds, bats and invertebrates) and marine animals.

3.3.1.3 Loss, alteration and/or degradation of habitat.

4 Transportation and Service Corridors

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads (Avg. Score: 2.00)

NJ Specific Threats: 4.2.1.5 Tall radio and utility towers with guy lines pose a strike hazard for migrant bats and birds, especially in poor visibility conditions (e.g., fog, nighttime, poor weather conditions).

4.4 Flight Paths

4.4.1 Airplane flight paths (Avg. Score: 1.00)

NJ Specific Threats: 4.4.1.1 Increased noise disturbance to wildlife, disrupting their normal behaviors.

4.4.1.2 Increased risk of collision between airplanes and birds, bats and insects.

5 Biological Resource Use

5.4 Fishing and Harvesting of Aquatic Resources

5.4.1 Intentional Use (subsistence/small scale) (Avg. Score: 2.00)

NJ Specific Threats: 5.4.1.2 Overharvesting of one species may lead to detrimental impacts on another; e.g., the harvesting of horseshoe crabs reduces the food availability for migrating shorebirds dependent on crab eggs.

5.4.2 Intentional Use (large scale) (Avg. Score: 3.00)

NJ Specific Threats: 5.4.2.1 Overharvesting of one species may lead to detrimental impacts on another; e.g., overharvest of menhaden affecting piscivorous birds.

5.4.3 Unintentional effects (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.4.3.6 Fishing gear used by commercial fisheries results in bycatch or entanglement of non-targeted wildlife leading to injury and/or mortality.

5.4.3.9 Decreased survival rate of horseshoe crabs bled for medical uses results in a diminished food supply for migrating shorebirds.

5.4.4 Unintentional effects (large scale) (Avg. Score: 2.00)

NJ Specific Threats: 5.4.4.5 Fishing gear used by commercial fisheries results in bycatch or entanglement of non-targeted wildlife leading to injury and/or mortality.

5.4.4.8 Decreased survival rate of horseshoe crabs bled for medical uses results in a diminished food supply for migrating shorebirds.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized) (Avg. Score: 1.50)

NJ Specific Threats: 6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.

6.1.1.3 Increased risk of harassment that results in a change in wildlife behavior and/or direct mortality from vehicle strikes.

6.1.1.4 Increased noise pollution.

6.1.1.5 Vehicle use on beaches can cause disturbance, harms breeding and foraging habitats, and can cause direct mortality of beach-nesting birds.

6.1.2 Boating (Avg. Score: 2.00)

NJ Specific Threats: 6.1.2.1 Alteration and/or degradation of aquatic habitat.

6.1.2.2 Increased disturbance to marine animals and ocean-, bay- and marsh-associated birds which can alter their behavior decreasing the likelihood of their success and/or reproduction.

6.1.3 Use of beaches (Avg. Score: 3.00)

NJ Specific Threats: 6.1.3.1 Increases disturbance to beach nesting birds that reduces nesting success, and reduces foraging and resting opportunities for a wide range of nesting and migrating shorebirds.

6.1.5 Wildlife observation and photography (Avg. Score: 2.00)

NJ Specific Threats: 6.1.5.1 Improperly conducted recreational activities may disrupt normal wildlife behaviors which can result in reduced reproductive success or survival, abandonment of critical sites, etc.

6.1.7 Other (Avg. Score: 1.00)

NJ Specific Threats: 6.1.7.1 Use of recreational or commercial pyrotechnics may cause temporary disturbance to wildlife, in particular to nesting birds.

6.1.7.3 Drone use in areas with sensitive wildlife (e.g., nesting and foraging birds, migrating and foraging/feeding whales) can alter their behavior and can cause disturbance that impacts their reproductive and/or foraging success.

6.3 Work and Other Activities

6.3.1 Unauthorized research projects at significant habitats (Avg. Score: 1.00)

NJ Specific Threats: 6.3.1.2 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.1.3 Activities conducted without proper precautions may disturb and disrupt normal wildlife behaviors, which may impact reproductive success or survival, cause abandonment of critical sites, etc.

6.3.2 Authorized research projects at significant habitats (Avg. Score: 1.00)

NJ Specific Threats: 6.3.2.3 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.2.4 Activities conducted without proper precautions may disturb and disrupt normal wildlife behaviors, which may impact reproductive success or survival, cause abandonment of critical sites, etc.

6.3.3 Other "work" unrelated to research (Avg. Score: 1.00)

NJ Specific Threats: 6.3.3.2 Intensive dune and beach management (including overuse of dune fencing, sand mining, mechanical beach raking, storm clean up), reduces foraging habitat for beach nesting and migratory shorebirds, and poses risks of injury and mortality to unfledged chicks.

7 Natural Systems Modifications

7.2 Dams and Water Management/Use

7.2.14 Tidal Water Management (Avg. Score: 1.00)

NJ Specific Threats: 7.2.14.2 Tidal water management for the purpose of managing for select species may alter existing hydrologic or vegetative conditions to the detriment of other species.

7.3 Other Ecosystem Modifications

7.3.1 Shoreline Stabilization (Avg. Score: 3.00)

NJ Specific Threats: 7.3.1.1 Efforts to stabilize barrier islands and shorelines, including jetties, groins, bulkheads, interfere with the natural geological processes needed to create and maintain high quality habitat for beach strand species.

7.3.5 Poor habitat management (Avg. Score: 1.00)

NJ Specific Threats: 7.3.5.11 Salt marsh water management to control mosquitoes may result in negative effects on other species (e.g., changing hydrology of low and high marsh).

7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

7.3.5.16 Lack of proactive management to preserve or maintain viable and functioning marshes for SGCN wildlife.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.4 Invasive non-native terrestrial/wetland animals (Avg. Score: 1.00)

NJ Specific Threats: 8.1.4.2 Free-roaming and feral domestic animals such as cats and dogs causes direct mortality of wildlife and disturbance to wildlife breeding and resting areas.

8.2 Problematic Native Species/Diseases

8.2.2 Named Species (Avg. Score: 2.00)

NJ Specific Threats: 8.2.2.1 Dogs on beaches create severe disturbance to beach nesting birds and reduce their nesting success.

8.5 Viral/Prion-induced Diseases

8.5.2 Named Species (Disease) (Avg. Score: 1.00)

NJ Specific Threats: 8.5.2.1 Diseases such as West Nile Virus, arenavirus, sudden oak death, Avian Influenza, and snake fungal disease cause morbidity or mortality to native populations.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.1 Domestic and Urban Waste Water

9.1.1 Sewage (Avg. Score: 1.00)

NJ Specific Threats: 9.1.1.1 Degradation of aquatic and marine water quality and habitats by changing turbidity, flow and water chemistry.

9.1.1.2 Leads to increased eutrophication and algae blooms that result in oxygen depletion.

9.2 Industrial and Military Effluents

9.2.1 Oil Spills (Avg. Score: 3.00)

NJ Specific Threats: 9.2.1.1 Oil spills render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.1.2 Oil spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.1.3 Oil spills cause external oiling of wildlife and ingestion of oil, both of which can injure or kill wildlife.

9.2.3 Other (Avg. Score: 1.00)

NJ Specific Threats: 9.2.3.2 Chemical spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.3.3 Chemical spills may render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.6 Excess Energy

9.6.1 Light Pollution (Avg. Score: 1.00)

NJ Specific Threats: 9.6.1.1 Artificial lighting can reduce suitability of adjacent habitat for species sensitive to artificial lights by disorienting wildlife, reducing foraging suitability or success, or increasing visibility to predators, resulting in reduced diversity and/or productivity of species in adjacent habitat.

9.6.3 Noise Pollution (Avg. Score: 1.00)

NJ Specific Threats: 9.6.3.1 Acute and chronic noise pollution in and adjacent to terrestrial and aquatic (marine and freshwater) environments could disrupt normal behaviors of wildlife such as migration, communication, feeding, eluding predators, resting and breeding, etc.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 1.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.3 Temperature Extremes

11.3.1 Temperature extremes (Avg. Score: 1.00)

NJ Specific Threats: 11.3.1.3 Temperature extremes of surface water and air degrades marine habitats and ecosystems, threatening marine wildlife. Such extremes also disrupt offshore currents and migratory patterns, species' ranges, and/or impact communities/food chains, all of which further impact the ecosystem.

11.3.1.4 Extremely low temperatures and/or extensive periods of unseasonably low temperatures during critical life history stages (e.g., hibernation, gestation/nesting) can alter animals' behaviors and decrease survivorship.

11.4 Storms and Flooding

11.4.1 Storms and flooding (Avg. Score: 2.00)

NJ Specific Threats: 11.4.1.2 Potentially damage coastal habitats, including beach- and marsh-nesting bird habitats and interdunal wetlands, and can increase marsh erosion.

11.4.1.6 Increased storms and flooding reduce nesting success, especially for ground-nesting birds.

11.4.1.7 Potentially damage coastal habitats, including beach and marsh habitats used by spawning horseshoe crabs, nesting diamondback terrapins, and resting and foraging birds.

11.6 Phenology Shifting or Alteration

11.6.2 Phenology shifts related to predator-prey ecology (Avg. Score: 3.00)

NJ Specific Threats: 11.6.2.2 Shifts timing of species migration, breeding and hibernation, and available food resources, causes redistribution of species, or mortality for species that are unable to relocate due to their already isolated habitat or limited mobility.

11.6.3 Phenology shifts related to species redistribution (Avg. Score: 1.00)

NJ Specific Threats: 11.6.3.1 Shifts in timing of species migration, breeding and hibernation, and available food resources, as a result of wildlife range shifts driven by climate change.

11.6.3.2 Shifts in nesting times or egg incubation durations can limit nest success and longterm populations.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 2.00)

NJ Specific Threats: 12.1.1.4 Lack of information on the morphometrics and trends of coastal salt marshes and salt marsh islands.

12.1.1.5 Lack of information regarding the SGCN populations that use managed salt marshes and the best techniques for making improvements for marsh-dependent SGCN wildlife.

12.1.1.6 Lack of information regarding migratory pathways and response of wildlife to lights and noise associated with offshore wind turbines.

12.1.2 Lack of up-to-date existing information (Avg. Score: 1.50)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.2.2 Lack of wildlife monitoring at sites with structures that pose high risk of mortality to SGCN wildlife.

12.1.3 Need to answer research question (Avg. Score: 1.50)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.3.3 Lack of studies specific to structural shellfish aquaculture (racks, bottom cages, bottom screens, etc.) and tending activities which may adversely impact horseshoe crabs, shorebirds and other benthic-dependent species.

12.1.3.4 Lack of information regarding the potential short- and long-term impacts of wind turbines and other tall coastal structures on migratory populations.

12.1.4 Need to develop new technique (Avg. Score: 2.00)

NJ Specific Threats: 12.1.4.3 Lack of techniques for high marsh preservation that includes impoundments and elevated islands.

12.1.4.4 Lack of consideration of habitat management opportunities in the course of salt marsh management for mosquito control.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 3.00)

NJ Specific Threats: 12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 2.00)

NJ Specific Threats: 12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.

12.4.0.3 Lack of internal understanding regarding beneficial habitat impacts of storm events leads to policies and practices that reverse or decrease such beneficial effects (e.g., beach-filling, shoreline hardening, "hazard" tree and log removal from forests, etc.

12.4.0.6 Techniques for ecological management or restoration of shorelines are not fully developed or evaluated for effectiveness for target and non-target SGCN in coastal areas.

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 1.00)

NJ Specific Threats:

14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 1.00)

NJ Specific Threats:

14.2.1.3 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various coastal management practices.

14.2.1.4 Need to develop greater understanding of and support for efforts implemented to maintain disturbance-free habitats that allow coastal wildlife populations to thrive alongside human residential and recreational uses.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 1.50)

NJ Specific Threats:

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.1 Enhance critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates through incentive programs with adjacent private landowners to increase the effective size of the habitat.

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.3 Secure and promote the protection/restoration of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through incentive programs.

1.2.1.25 Create incentives (non-monetary and/or monetary) within State regulations to assist and programs to deliver those incentives to aquaculture growers to relocate, for example, from intertidal to subtidal lease areas through buyouts of leases or microloans, and/or promoting on-lease conservation measures used by aquaculture growers (such as the implementation of conservation easements, use of living shorelines, incorporation of BMPs for habitat protection, etc.) for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2 Direct Management of Natural Resources

2.6 Hazard or infrastructure removal

2.6.6 Shoreline armoring removal

2.6.6.1 Remove shoreline armoring to reduce its impacts on aquatic habitats.

2.9 Living shorelines

2.9.1 Beach renourishment

2.9.1.1 Implement best management practices for using mined sand or dredged material to improve habitat for wildlife, particularly for spawning horseshoe crabs and migrating shorebirds.

2.9.1.3 Where beach renourishment projects are deemed necessary, implement such projects with a design to increase availability of nesting and foraging habitat for beach nesting birds.

2.9.1.4 Implement beach renourishment strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimizes harm to wildlife, particularly SGCN.

2.9.1.5 Expand the acreages and enhance the effective size of SGCN habitats by utilizing beach renourishment to restore adjacent, less optimal or unsuitable, habitats.

2.9.1.6 Reclaim degraded rare species habitats using beach renourishment, when appropriate, to restore habitat value for the documented/target SGCN.

2.9.1.7 Protect significant natural and/or unique communities by implementing best management practices for beach renourishment, when applicable.

2.9.1.8 Minimize habitat loss of critical coastal beach habitats that provide nesting, migrating, and wintering areas for birds and other coastal species by maintaining or enhancing these areas through beach renourishment.

2.9.1.9 Manage beaches to divert human activity away from staging areas for red knots and other migratory shorebirds during critical periods.

2.9.1.10 Repair beaches associated with marshes damaged by salt hay farm/dike abandonment and restore degraded sites for targeted SGCN species and their habitats.

2.9.1.11 Enhance critical migratory stopover beach habitats for songbirds, raptors, shorebirds, bats and invertebrates through beach renourishment and expand management to adjacent private lands to increase the effective size of the habitat.

2.9.1.12 Implement beach habitat management on state and other conservation lands to enhance food availability for migratory species (birds, bats, invertebrates).

2.9.1.13 Conduct beach renourishment to maintain, enhance and/or create feeding and roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

2.9.1.14 Implement best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated beach habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.9.1.16 Prevent or ameliorate near-term impacts of climate change throughout the State but in particular within the coastal and Delaware Bay areas by implementing habitat management strategies that will establish/improve habitat resilience, such as beach renourishment, that benefits wildlife inhabiting these areas.

2.9.2 Erosion control structures

2.9.2.1 Install breakwaters in the form of living shorelines to reduce the impact of wave erosion while preserving the natural character of the site.

2.9.3 Sand dune restoration

2.9.3.1 Prevent or ameliorate near-term impacts of climate change throughout the State but in particular within the coastal and Delaware Bay areas by implementing habitat management strategies that will establish/improve habitat resilience, such as sand dune restoration, that benefits wildlife inhabiting these areas.

2.9.3.4 Reclaim degraded rare species habitats using sand dune restoration needed to restore habitat value for the documented/target SGCN.

2.9.3.6 Minimize habitat loss of critical coastal dune habitats that provide nesting, migrating, and wintering areas for birds and other coastal species by maintaining or enhancing these areas through sand dune restoration.

2.9.3.7 Manage sand dunes to divert human activity away from staging areas for red knots and other migratory shorebirds during critical periods.

2.9.3.10 Implement sand dune restoration strategies on state and other conservation lands to enhance food availability for migratory species (birds, bats, invertebrates).

2.9.3.11 Conduct sand dune restoration to maintain, enhance and/or create feeding and roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State and evaluate the effectiveness of such management.

2.9.3.12 Implement best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated sand dune habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.11 Restore and/or enhance critical migratory terrestrial and aquatic habitats (e.g., beach, grasslands, forest, scrub-shrub, etc.) for songbirds, raptors, shorebirds, waterfowl, bats and invertebrates through habitat restoration efforts and expand habitat restoration to adjacent private lands to increase the effective size of the habitat.

2.10.0.23 Restore and/or enhance roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.44 Manage phragmites adjacent to coastal marshes of interest, in particular those that are within underdeveloped areas and are unprotected, through herbicide application and water management to improve resiliency of the marshes to sea level rise.

2.12 Water management

2.12.1 Ditch plugs

2.12.1.1 Implement best management practices (BMPs), protective strategies, and guidelines for ditch plugging to maintain and enhance healthy, resident and migratory SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.12.6 Tide gate

2.12.6.1 Prevent or ameliorate near-term impacts of climate change throughout the State but in particular within the coastal and Delaware Bay areas by implementing habitat management strategies that will establish/improve habitat resilience, such as tide gates, that benefits wildlife inhabiting these areas.

2.12.7 Waterfowl impoundment maintenance

2.12.7.1 Manage impoundments to benefit SGCN species inhabiting them (e.g., bitterns, rails, ducks, turtles and some invertebrates).

2.12.7.2 Use impoundment management to create feeding and roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

2.12.7.3 Implement best management practices (BMPs), protective strategies, and guidelines for impoundment management to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.12.7.4 Implement impoundment management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimizes harm to wildlife, particularly SGCN.

2.12.7.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through impoundment management.

2.12.7.6 Reclaim degraded rare species habitats through impoundment management needed to restore habitat value for the documented/target SGCN.

2.12.7.7 Protect significant natural and/or unique communities by implementing best management practices for impoundment management.

2.12.7.9 Minimize habitat loss of critical coastal habitats in Delaware Bay that provide nesting, migrating, and wintering areas for birds and other coastal species by maintaining or enhancing these areas through impoundment management.

2.12.7.10 Enhance critical migratory stopover beach habitats for songbirds, raptors, shorebirds, bats and invertebrates through impoundment management and expand management to adjacent private lands to increase the effective size of the habitat.

2.12.7.14 Prevent or ameliorate near-term impacts of climate change throughout the State but in particular within the coastal and Delaware Bay areas by implementing habitat management strategies that will establish/improve habitat resilience, such as impoundment management, that benefits wildlife inhabiting these areas.

2.12.7.15 Implement impoundment management on state and other conservation lands to enhance food availability for migratory species (birds, bats, invertebrates).

2.12.8 Watering facilities

2.12.8.2 Manage water levels in impoundments to improve coastal marsh habitat availability to wildlife and improve resiliency of the marshes to sea level rise.

2.13 Wildlife damage management

2.13.0 Nuisance fish and wildlife damage

2.13.0.3 Investigate alternative saltmarsh mosquito control methods that may produce benefits for coastal marsh dependent SGCN wildlife, including but not limited to high-marsh nesting birds and migrating shorebirds and landbirds.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.6 Conduct long-term studies on resident and migratory SGCN to determine if there are changes to the populations' demography (productivity, survival, dispersal) and/or to their critical and/or supporting habitats (i.e., diminishing in value, acreage or connectivity, etc.), in particular changes that would not maintain SGCN at viable levels for species populations. Update data and GIS maps; provide updated information to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.9 Identify SGCN (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources, and compile/collect and evaluate data/information regarding potential management strategies to improve the availability of such SGCN's food resources.

3.0.0.10 Conduct long-term studies to evaluate the effectiveness of management strategies implemented to enhance food/prey availability for SGCN [whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources] through studies that investigate the populations and health of the food resources as well as the target SGCN. Revise management strategies as needed and continue to monitor the effectiveness of the efforts.

3.0.0.11 Develop, implement and evaluate the effectiveness of town plans that avoid impacts to SGCN species and their habitats.

3.0.0.17 Conduct long-term monitoring of marsh- and beach-dependent SGCN (and their habitats) to evaluate the effectiveness of the management strategies implemented to repair degraded marshes and beaches damaged by salt hay farm/dike abandonment within all bay shore areas.

3.0.0.18 Develop, implement and evaluate the effectiveness (through research and long-term monitoring) of engineering standards that embrace both shore protection/resiliency and habitat creation for shorebirds, horseshoe crabs and other coastal species along the Atlantic and Delaware Bay coasts that minimize horseshoe crab impingement and damage to beach habitat from residential and commercial construction.

3.0.0.21 Conduct long-term monitoring to determine the impacts of the fish and shellfish aquaculture industries on focal and non-focal SGCN and their habitats (i.e., NJ bays, estuaries, ocean areas). Assess the success of management actions implemented to minimize these impacts and make specific recommendations to the NJ DEP regarding how such management efforts may be improved to minimize harm to wildlife and their habitats.

3.0.0.25 Identify pathways of migratory SGCN in the Atlantic Coastal and Marine Regions (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and use the data to help evaluate the potential short- and long-term impacts of wind turbines, radio towers, utility guy lines, and other tall coastal structures on migratory populations.

3.0.0.26 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species including objectives and guidance pertaining to and the condition/status of critical and supporting habitats.

3.0.0.27 Evaluate the effectiveness of strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals through research and monitoring. Develop and provide NJ DEP and other appropriate governing agencies/commissions a summary of findings and recommendations to improve such efforts.

3.0.0.28 Evaluate best management practices for using mined sand or dredged material to improve habitat for wildlife, particularly for spawning horseshoe crabs and migrating shorebirds.

3.0.0.29 Conduct long-term monitoring of sensitive marine species habitats and migration and/or spawning areas to determine their continued use or changes as a result of habitat shifts or alterations that may warrant further management actions.

3.0.0.30 Conduct research to investigate the feasibility of managing and/or creating roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.2 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.0.5 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

3.2.0.8 Implement and conduct long-term monitoring of control measures aimed at minimizing the impacts of problematic species and/or diseases to evaluate the effectiveness of such efforts and to identify and incorporate additional strategies as appropriate.

3.2.0.17 Conduct monitoring at constructed wind farms (within or outside of NJ) to assess the impacts on migratory species (birds, bats, insects) and determine if NJ's land use planning efforts and/or smart-growth plans need to be revised.

3.2.0.19 Develop, implement and evaluate aquaculture practices in coastal areas that are compatible with the recovery of SGCNs and industry needs.

3.2.0.20 Evaluate the effectiveness of BMPs for mosquito control methods that may produce benefits for coastal marsh dependent SGCN wildlife, including but not limited to high-marsh nesting birds and migrating shorebirds and landbirds.

3.2.0.26 Develop, implement and evaluate efforts to remove horseshoe crab impingement hazards, and provide recommendations of potential improvements, if warranted.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.2 Age, size and sex structure

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.3 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) remaining high and low marsh habitats with natural buffers and stable water levels that provide suitable habitat for SGCN and marsh habitats that would benefit from restoration. Conduct research to assess their condition for nesting, migrating and wintering birds.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.11 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the quality and importance of areas with submerged aquatic vegetation to benefit waterfowl, finfish, and shellfish species.

3.3.1.14 Compile information (obtained through literature reviews, communication with other States along the Atlantic coast, academia, etc.) regarding the impacts of above water operation of wind turbines on migratory marine birds and bats. Provide data to appropriate governing agencies and/or State commissions for integration into permitting review processes.

3.3.1.16 Gather "best information" for spatial modeling and update/create a current model/depiction of anticipated habitat shifts from sea-level rise, flooding, etc.

3.3.1.18 Conduct an assessment using available data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels.

3.3.1.21 Conduct comprehensive baseline surveys of all marsh islands; surveys to include, but are not limited to, documented elevations, and assessments of the habitat's current condition and vulnerability of dependent SGCN species in relation to the increased inundation rate.

3.3.1.22 Identify, assess and prioritize marsh habitats for restoration where various management tools (such as increasing salinity through the management of water levels or chemical applications) may be effective in reducing the presence of phragmites.

3.3.1.23 Identify areas (through surveys/studies, predictive modeling, review of available data, enlistment of habitat management and/or species experts, etc.) where the State can allow coastal marsh migration due to sea level rise, and target these areas for land acquisition and/or land management to accommodate this transition. Targeted areas should include underdeveloped areas adjacent to unprotected coastal marshes.

3.3.1.25 Compile an inventory of all horseshoe crab impingement hazards and share with permitting agencies, and the fisheries organizations and industry.

3.3.1.27 Develop a matrix that lists every commercial and recreational fishery and aquaculture facility that operates in state waters and for each fishery listed, provide details regarding their fishing seasons, gear descriptions, locations and number of fishers. Add a GIS component to overlay species of concern and sensitive areas.

3.3.1.28 Identify key habitats for the potential allowance of natural coastal processes without interfering through shoreline stabilization, etc. and evaluate the risks and benefits if coastal migration was permitted to occur naturally. Create a GIS map of the identified areas; provide the assessment and mapping to local towns and other appropriate governing agencies.

3.3.1.29 Identify coastal wildlife habitats unimpacted by development and/or at greatest risk of habitat loss to help guide enlightened coastal stabilization efforts (i.e., use of soft stabilization) to reduce the impacts on wildlife and their habitats.

3.3.1.30 Using available data, model a comprehensive Marine Submerged Aquatic Vegetation Mapping project (similar to the Statewide freshwater wetlands mapping project) of sufficient quality and integrity that it could support the NJ DEP's coastal regulatory programs. Continue to conduct surveys to gather additional data to test and improve the model.

3.3.2 Monitoring

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.7 Conduct studies on land use practices such as ditching, impounding, dredging, open marsh water management, burning, and marsh restoration to evaluate the effectiveness and potential impacts on marsh-dependent SGCN.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.3.2.19 Once baseline data on the marsh islands' and associated SGCN species' vulnerability to inundation is completed, continue to conduct long-term monitoring the islands to determine sustainability for wildlife dependent on these areas.

3.3.2.21 Develop, implement and evaluate the effectiveness of management strategies use to restore marsh habitat (e.g., phragmites reduction).

3.3.2.22 Conduct short- and long-term monitoring of the current natural processes affecting sediment transport along the coast. Share findings with organizations/agencies attempting to design beach nourishment projects in a manner that will be beneficial to wildlife.

3.3.2.23 Conduct long-term monitoring of marine submerged aquatic vegetation and update the Marine Submerged Aquatic Vegetation Mapping [to be developed under baseline activities] to provide the NJ DEP's coastal regulatory programs with the most current data.

3.5 Techniques development

3.5.1 Artificial propagation studies

3.5.1.1 Conduct studies to evaluate the impacts (beneficial and detrimental) of aquaculture on migratory shorebirds, waterfowl, finfish, shellfish and other SGCN and their habitats, including evaluation of the relative effects of location and aquaculture techniques.

3.5.1.2 Develop and conduct studies that evaluate relative efficacy and feasibility of management actions designed to minimize adverse impacts and enhance beneficial effects.

3.5.3 Habitat restoration methods

3.5.3.2 Develop management strategies to improve the availability of prey/food resources for SGCN whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources. Monitor and investigate the management strategies over time to determine success and/or the need to revise methods.

3.5.3.5 Develop best management practices for using mined sand or dredged material to improve habitat for wildlife, particularly for spawning horseshoe crabs and migrating shorebirds.

3.5.3.6 Develop/improve management strategies to repair marshes and associated beaches damaged by salt hay farm/dike abandonment for all bay shore areas currently degraded.

3.5.3.8 Develop best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.12 Develop management actions to minimize the documented adverse impacts and reduce risks of potential adverse impacts of aquaculture on migratory shorebirds and other SGCN, including waterfowl, finfish, and shellfish and their habitats.

3.5.3.13 Developing engineering standards that embrace both shore protection/resiliency and habitat creation for shorebirds, horseshoe crabs and other coastal species along the Atlantic and Delaware Bay coasts.

3.5.3.14 Develop aquaculture practices in the coastal areas that are compatible with the recovery of SGCN.

3.5.3.16 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.3.18 Develop recommendations to improve methods on land use practices such as ditching, impounding, dredging, open marsh water management, burning, and marsh restoration based on potential impacts on marsh-dependent SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.3.27 Conduct an assessment and develop a location list of available equipment for boom deployment during oil spills.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.1 Develop studies to evaluate management strategies to improve the availability of prey/food resources for SGCN whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources. Monitor and investigate the management strategies over time to determine success and/or the need to revise methods.

3.5.4.3 Investigate alternative saltmarsh mosquito control methods that may produce benefits for coastal marsh dependent SGCN wildlife, including but not limited to high-marsh nesting birds and migrating shorebirds and landbirds.

3.5.4.11 Develop aquaculture practices in the Delaware Bay that are compatible with the recovery of SGCN.

3.5.4.13 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.17 Investigate new, non-invasive techniques for SGCN population evaluation through literature review, expert opinion, trial studies (if low risk), etc.

3.5.4.18 Investigate the effectiveness of survey techniques through selected “ground truthing” and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

5 Facilities and Areas

5.15 Wildlife Management Areas

5.15.6 Roads

5.15.6.2 Clearly post areas/trails where vehicle access is not permitted.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.1 Enhance and increase the effective size of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates by securing adjacent habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.3 Secure and protect riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.5 Secure and protect critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.1 Land acquisition

6.1.1 Fee title

6.1.1.1 Use state, federal, and local land acquisition programs (e.g., Green Acres, Blue Acres, etc.) to acquire abandoned or failing bay shore communities and to relocate displaced people and infrastructure.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.1 Promote the protection of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates and enhance these lands by increasing the effective size through conservation area designations of stopover habitats and adjacent private lands.

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.5 Promote the protection of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through conservation area designations.

7 Law Enforcement

7.1 Law enforcement

7.1.3 Sub-national Level

7.1.3.2 Increase the number of law enforcement officers tending to wildlife issues to a reasonable number to sufficiently cover the State and marine waters.

7.1.4 Scale Unspecified

7.1.4.2 Restrict human activity from staging areas for red knots and other migratory shorebirds through increasing law enforcement presence.

7.1.4.3 Increase law enforcement presence proximate to sensitive areas [e.g., avian nesting sites, in particular rookeries, and reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively)] to deter human activity and subsequent disturbance to SGCN.

7.1.4.4 Improve enforcement of policies/regulations aimed at protecting and preserving critical coastal and marsh habitats, and secure mitigation for losses that create an environmental benefit.

7.1.4.5 Enforce current policies and/or regulations to increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal SGCN, and implement and enforce amended policies/regulations.

7.1.4.8 Implement policies that protect critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates.

7.1.4.11 Implement and enforce policies/regulations that will increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

7.1.4.22 Implement policies and/or regulations that prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

7.1.4.25 Encourage the enforcement of municipal laws regulating domestic pets that may predate on wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.1 Coordinate research efforts among government agencies, non-government conservation partners and other stakeholders to investigate the impacts of aquaculture on migratory shorebirds, waterfowl, finfish, shellfish and other SGCN and their habitats, to determine relative effects of farming locations and aquaculture techniques, and to evaluate management actions to minimize such impacts.

8.1.0.2 Develop a team of personnel from government entities, conservation organizations and other stakeholders engaged in oil/gas spill response for marine and freshwater habitats to develop a feasible plan for oil spill response and/or to amend NJ's current oil spill response plan that clearly outlines each organizations responsibilities and an assessment and location list of available equipment for boom deployment during oil spills.

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.1.0.6 Engage government agencies, conservation partners and other stakeholders in discussions focused on sharing information regarding coastal and marine critical wildlife habitats, developing comprehensive mapping to assist in reducing impacts of energy production activities, and establishing a long-term monitoring program to update the data. Ensure this information is available to appropriate personnel for planning or response measures.

8.1.0.9 Review the marine fish code enforcement policies relative to SGCN or sensitive game species' populations and fecundity, and amend the harvest quota or "bag limits" as needed, and address enforcement of such quotas.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.20 Organize a small focal group of government and non-government agencies/organizations responsible for decisions regarding beach/dune management to share and coordinate their goals so that comprehensive planning can attempt to meet all needs.

8.1.0.29 Encourage government agencies and conservation partners to engage science community in the study of interactions among aquaculture, SGCN, their habitats, and potential impacts on migratory shorebirds and horseshoe crabs.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.31 Encourage government agencies, conservation partners and other stakeholders to work together to create GIS mapping for marine wildlife and habitat to assist in reducing impacts of energy production activities. Ensure this information is available to appropriate personnel for planning or response measures.

8.1.0.39 Deploy stewards at active nesting areas to work with and educate the public on how to reduce disturbance to birds.

8.1.0.40 Encourage researchers, land managers, naturalists and enthusiasts to follow proper procedures for the coordination and/or permitting of research/management activities involving wildlife and sensitive habitats, and discourage activities that alter vegetation or wetlands, or cause harm or disturbance to wildlife.

8.1.0.41 Engage beach-owning entities (e.g., government, non-government and non-profit organizations, and landowners) in a constructive dialogue to develop guidelines for management of beach/dune communities and to ensure that each group is educated and aware of the needs of the other groups.

8.1.0.42 Engage citizens, wildlife observers and photographers through discussions and distributable information regarding the importance of and encouraging implementing responsible and ethical behavior when observing wildlife by developing an alliance of wildlife photographers and widely circulating recommendations on how to reduce impact.

8.1.0.45 Form cooperative partnerships with airports and airline companies to facilitate habitat creation away from airports and outside of flight patterns, and to identify seasonal wildlife strike risks to determine if seasonal shifts in flight patterns will minimize this risk.

8.1.0.46 Form cooperative partnerships with dredging companies to facilitate habitat creation and enhancement within project areas, and to identify seasonal timing of activities that would minimize impacts to wildlife and their habitats.

8.2 Recruitment and retention activities

8.2.3 For wildlife watching

8.2.3.1 Develop and implement nature-focused tourism opportunities including wildlife viewing sites, interpretive signage highlighting unique ecosystems/habitats, and wildlife-related recreational opportunities that do not negatively impact SGCN or their habitats.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.7 Develop and provide (or otherwise make publicly available) educational programs and/or materials that describe the negative impacts of off-road vehicles and watercraft use in and adjacent to critical SGCN habitats, and the importance of confining such activities to more appropriate locations and/or seasons.

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.22 Post signage in sensitive coastal habitats (e.g., bird and Diamondback Terrapin nesting areas) to educate the boating community on responsible use of these areas.

8.3.0.23 Develop an educational outreach program for coastal municipalities and residents to promote an understanding of the benefits of soft structures over hard structures for shoreline stabilization.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.17 Develop a plan to minimize nutrient and effluent loads from aquaculture practices.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.2 Develop a management plan to improve the availability of prey/food resources for SGCN whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources.

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.6 Amend NJ's current oil spill response plan to 1) expand the geographic area addressed, 2) expand the targeted species impacted and in need of recovery, and 3) revise current and integrate new actions into the plan as needed.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.15 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.1.18 Using baseline and monitoring data, develop a plan and seek funding for the removal of horseshoe crab impingement hazards.

9.3.2 Listed species recovery planning

9.3.2.1 Develop proactive species recovery plans for all endangered and threatened species including guidance and objectives pertaining to critical and supporting habitat to meet and maintain recovery goals.

9.3.3 Habitat management planning

9.3.3.1 Develop a management plan to improve the availability of prey/food resources for SGCN whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources.

9.3.3.2 Develop a management plan for using mined sand or dredged material to improve habitat for wildlife, particularly for spawning horseshoe crabs and migrating shorebirds.

9.3.3.3 Integrate best management practices (BMPs) regarding dune and beach management into beach nesting bird management agreements with government agencies (and private landowners where necessary).

9.3.3.4 Create habitat restoration plans to repair marshes and associated beaches damaged by salt hay farm/dike abandonment for all bay shore areas currently degraded.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.12 Develop a management plan using engineering standards that embrace both shore protection/resiliency and habitat creation for shorebirds, horseshoe crabs and other coastal species along the Atlantic and Delaware Bay coasts.

9.3.3.13 Develop a management plan that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas and prevents or ameliorates near-term impacts of climate change throughout the State, but in particular within the coastal and Delaware Bay areas.

9.3.3.14 Develop a management plan using aquaculture practices in coastal areas that are compatible with the recovery of SGCN.

9.3.3.16 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.20 Develop an action plan for immediate implementation should habitat levels fall below the minimum necessary size and/or structure within the Cape May Peninsula to sustain the avian migration.

9.3.3.25 Develop a habitat management plan focused on areas important to near-shore, coastal species (e.g., herring, sturgeon, terrapin, nesting birds) that prioritizes these areas to direct resources to minimize the impacts of sea-level rise, flooding and storms (including extreme rain events) such as increased erosion of beach, mudflat and marsh habitats, and the increased risk of saltwater intrusion into freshwater habitats. Gather "best information" for spatial modeling of anticipated habitat shifts from sea-level rise, flooding, etc.

9.3.3.28 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.3.29 Develop habitat management plans aimed at reducing or eliminating negative impacts of ORVs.

9.3.3.30 Using baseline and monitoring data, develop a plan and seek funding for the removal of horseshoe crab impingement hazards.

9.3.3.31 Using data from baseline inventory and monitoring of all current marsh islands and their vulnerability to inundation as a result of sea level rise, create a plan to delineate each island's ideal fit for habitat management (e.g., restoration, hasting, dredging). Planning will factor in criteria to designate which islands should be maintained or restored, and which will be passively allowed to submerge.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.6 Review all projects to be conducted in or adjacent to coastal wetlands and marshes, and provide recommendations on how to best avoid or reduce human disturbance at nesting areas (for example, timing restrictions) and actions not permitted.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.11 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed offshore energy projects relating to drilling, extraction and distribution of petroleum and gas products to reduce habitat destruction and minimize impacts on wildlife.

11.1.1.13 Use the best available science (species data, habitat present, wind farm layout options, wind blade impacts on migratory species, location of migration routes, etc.) when conducting regulatory reviews of proposed wind farm projects to minimize impacts on migratory and resident wildlife and reduce habitat fragmentation.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.2.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into the environmental review process to help establish policies and plans that minimize the impact of aquaculture on fish and wildlife.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.20 Provide educational resources and technical support to public and private landowners and land managers to promote the protection and/or enhancement of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN.

11.2.0.21 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates to promote the protection and/or enhancement of those adjacent habitats to increase the effective size of the migratory habitat.

11.2.0.23 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to SGCN habitats to promote the protection and/or enhancement of those adjacent habitats to increase the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and that connect conserved SGCN habitats.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.0.27 Provide educational resources and presentations to coastal municipalities and residents to promote the understanding of the benefits of soft structures over hard structures for shoreline stabilization.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.1 Engage partners and stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.5 Provide educational resources, training programs, and on-the-ground guidance to municipalities, state and federal agency resource managers on tasks such as writing and integrating Beach Management Plans into other management documents.

100 Law and Policy

100. Legislation

100.1.3 Sub-national Level

100.1.3.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.3.4 Initiate legislative action to establish an annual budgetary line item designating funds to support programs and monitoring stations throughout Barnegat, Little Egg Harbor and Great Bay focused on long-term monitoring of submerged aquatic vegetation, both native and exotic species.

100.1.4 County and Local

100.1.4.1 Enhance critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates through the local ordinances of adjacent private lands to increase the effective size of the habitat.

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.8 Secure critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through local ordinances.

100.1.4.13 Encourage municipal laws regulating domestic pets that may predate on wildlife.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.5.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into state/local policy to minimize the impact of aquaculture on fish and wildlife.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.2 Improve policies/regulations aimed at protecting and preserving critical coastal and marsh habitats and securing mitigation for losses that create an environmental benefit.

100.3.0.3 Develop policies that will promote the long term protection of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates.

100.3.0.4 Promote policies and regulations that support marine conservation zone designations in suitable areas identified through research and literature.

100.3.0.5 Develop policies that will promote improved and secure habitat connections between conserved SGCN habitats.

100.3.0.7 Amend current policies and/or regulations to increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.16 Create regulations that restrict human activity from staging areas for red knots and other migratory shorebirds.

100.3.0.20 Develop policies and/or regulations that prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

100.3.0.23 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.38 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.3.0.39 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.47 Investigate regulatory options available to direct the location of aquaculture activities in Aquaculture Development Zone 4 (Delaware Bay area) in a manner which minimizes the loss of wildlife habitats and adverse impacts to the environment.

100.3.0.48 Propose new State law or regulation mandating that a State-level "development impact fee" be assessed on all new development approved by municipalities (via the Municipal Land Use Law processes), and dedicate such monies to the development and implementation of regional Habitat Conservation Plans (or existing plans/programs serving the same regional function).

100.3.0.49 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address the issue of disturbance to habitat or species as a result of human activities (e.g., construction, bridge maintenance, road work, etc.).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.55 Develop regulations to address potentially adverse effects of aquaculture on SGCN species and their habitats.

100.3.0.56 Develop regulations that when implemented will protect critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates.

100.3.0.59 Develop regulations that when implemented will increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

100.3.0.68 Develop regulations that when implemented will prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100.3.2 State Land Acquisition Programs

100.3.2.1 Increase opportunities for habitat restoration by making any necessary policy changes to state, federal and local land acquisition programs (e.g., Green Acres, Blue Acres, etc.) to allow for acquisition within abandoned or failing bay shore communities, including mechanisms to relocate displaced people and infrastructure.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.10 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.4.0.11 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Northern Harrier

Focal species that comprise this Conservation Target:

Northern Harrier

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 1.1.1.2 Loss, alteration and/or degradation of habitat.

1.1.2 Residential development using materials that cause collision hazards (Avg. Score: 1.00)

NJ Specific Threats: 1.1.2.1 Collision risk to volant species (birds, bats and invertebrates).

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.2.2 Commercial development using materials that cause collision hazards (Avg. Score: 1.00)

NJ Specific Threats: 1.2.2.1 Collision risk to volant species (birds, bats and invertebrates).

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats: 1.3.1.2 Loss, alteration and/or degradation of habitat.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture (Avg. Score: 3.00)

NJ Specific Threats: 2.1.1.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.1.2 Conversion, and subsequent loss, of high salt marsh to low salt marsh threatens high-marsh dependent species and those dependent on the marsh-upland ecotone.

2.1.1.4 Salt hay farming on Delaware Bay marshes, and the subsequent conversion of those farms to fully tidal marshes, results in compressed sediments that are less resilient to coastal forces of erosion and sea level rise.

3 Energy Production and Mining

3.1 Oil and Gas Facilities and Pipelines

3.1.1 Distribution processes of petroleum and other liquid hydrocarbons (Avg. Score: 1.00)

NJ Specific Threats: 3.1.1.1 Fragments terrestrial and aquatic habitats.

3.1.1.2 Loss, alteration and/or degradation of habitat.

3.1.1.3 Increased risk of oil spills.

3.1.1.4 Increased noise pollution.

3.1.2 Natural gas distribution processes (Avg. Score: 1.00)

NJ Specific Threats: 3.1.2.1 Fragments terrestrial and aquatic habitats.

3.1.2.2 Loss, alteration and/or degradation of habitat.

3.3 Renewable Energy

3.3.1 Wind Power (Avg. Score: 2.00)

NJ Specific Threats: 3.3.1.1 Turbines, blades, and structure foundations create a collision risk to volant species (birds, bats and invertebrates) and marine animals.

3.3.1.3 Loss, alteration and/or degradation of habitat.

3.3.2 Solar Power (Avg. Score: 1.00)

NJ Specific Threats: 3.3.2.1 Fragments terrestrial habitats.

3.3.2.2 Loss, alteration and/or degradation of habitat.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.1.2 Movement of cars and other vehicles on roads and railroads (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 4.1.2.1 Increased vehicle traffic increases the risk of wildlife mortality from strikes.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads (Avg. Score: 2.00)

NJ Specific Threats: 4.2.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species, inhibiting dispersal of non-volant animals, reducing gene flow, and creating barriers to fish when service line-associated roads cross streams (e.g., bridges, culverts, fords, etc.).

4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

4.2.1.3 Powerline structures attract perching raptors, increasing the risk of raptor electrocution.

4.2.1.5 Tall radio and utility towers with guy lines pose a strike hazard for migrant bats and birds, especially in poor visibility conditions (e.g., fog, nighttime, poor weather conditions).

4.3 Shipping Lanes

4.3.2 Dredging impacts (Avg. Score: 1.00)

NJ Specific Threats: 4.3.2.2 Historic and current reuse of containment facilities over time may disrupt/displace nesting birds.

4.4 Flight Paths

4.4.1 Airplane flight paths (Avg. Score: 1.00)

NJ Specific Threats: 4.4.1.1 Increased noise disturbance to wildlife, disrupting their normal behaviors.

4.4.1.2 Increased risk of collision between airplanes and birds, bats and insects.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized) (Avg. Score: 1.00)

NJ Specific Threats: 6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.

6.1.1.3 Increased risk of harassment that results in a change in wildlife behavior and/or direct mortality from vehicle strikes.

6.1.1.4 Increased noise pollution.

6.1.2 Boating (Avg. Score: 2.00)

NJ Specific Threats: 6.1.2.2 Increased disturbance to marine animals and ocean-, bay- and marsh-associated birds which can alter their behavior decreasing the likelihood of their success and/or reproduction.

6.1.5 Wildlife observation and photography (Avg. Score: 2.00)

NJ Specific Threats: 6.1.5.1 Improperly conducted recreational activities may disrupt normal wildlife behaviors which can result in reduced reproductive success or survival, abandonment of critical sites, etc.

6.1.5.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.1.7 Other (Avg. Score: 1.00)

NJ Specific Threats: 6.1.7.1 Use of recreational or commercial pyrotechnics may cause temporary disturbance to wildlife, in particular to nesting birds.

6.1.7.3 Drone use in areas with sensitive wildlife (e.g., nesting and foraging birds, migrating and foraging/feeding whales) can alter their behavior and can cause disturbance that impacts their reproductive and/or foraging success.

6.2 Military Exercises

6.2.1 Military exercises (Avg. Score: 1.00)

NJ Specific Threats: 6.2.1.1 Military testing and training exercises may inflict disturbance and potential physical harm to wildlife.

6.3 Work and Other Activities

6.3.1 Unauthorized research projects at significant habitats (Avg. Score: 1.00)

NJ Specific Threats: 6.3.1.2 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.1.3 Activities conducted without proper precautions may disturb and disrupt normal wildlife behaviors, which may impact reproductive success or survival, cause abandonment of critical sites, etc.

6.3.2 Authorized research projects at significant habitats (Avg. Score: 1.00)

NJ Specific Threats: 6.3.2.3 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.2.4 Activities conducted without proper precautions may disturb and disrupt normal wildlife behaviors, which may impact reproductive success or survival, cause abandonment of critical sites, etc.

7 Natural Systems Modifications

7.2 Dams and Water Management/Use

7.2.1 Abstraction of Surface Water (domestic use) (Avg. Score: 1.00)

NJ Specific Threats: 7.2.1.6 Impoundments may alter the water levels in high marshes and mudflats, impacting those foraging and nesting habitats.

7.2.3 Abstraction of Surface Water (agricultural use) (Avg. Score: 1.00)

NJ Specific Threats: 7.2.3.7 Impoundments may alter the water levels in high marshes and mudflats, impacting those foraging and nesting habitats.

7.2.7 Abstraction of Ground Water (agricultural use) (Avg. Score: 1.00)

NJ Specific Threats: 7.2.7.1 Heavy withdrawal of ground water for agricultural use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.14 Tidal Water Management (Avg. Score: 2.00)

NJ Specific Threats: 7.2.14.1 Freshwater tidal management for flood control alters water levels and salinity in tidal wetlands.

7.2.14.2 Tidal water management for the purpose of managing for select species may alter existing hydrologic or vegetative conditions to the detriment of other species.

7.2.14.3 Open marsh water management (and other techniques) to control mosquito populations may alter existing hydrologic or vegetative conditions to the detriment of other species.

7.2.14.4 Manipulation of marsh water levels may disturb nesting areas and flood nests.

7.3 Other Ecosystem Modifications

7.3.1 Shoreline Stabilization (Avg. Score: 1.00)

NJ Specific Threats: 7.3.1.1 Efforts to stabilize barrier islands and shorelines, including jetties, groins, bulkheads, interfere with the natural geological processes needed to create and maintain high quality habitat for beach strand species.

7.3.2 Inappropriate timing of mowing (Avg. Score: 2.00)

NJ Specific Threats: 7.3.2.1 Increased risk of direct mortality and/or reduced productivity of wildlife, as well as reduced use by migrating species.

7.3.5 Poor habitat management (Avg. Score: 3.00)

NJ Specific Threats: 7.3.5.5 Habitat management that alters or removes vegetation without implementing long-term management increases the risk of invasive and exotic plants establishing themselves, outcompeting native vegetation.

7.3.5.6 Habitat management, including that which occurs on public and private lands, that does not consider timing and species' behaviors can result in the direct mortality and/or alteration or loss of habitat.

7.3.5.10 Ditching, draining and filling of marshes and wetlands eliminates habitat and degrades the remaining surrounding areas for wildlife.

7.3.5.11 Salt marsh water management to control mosquitoes may result in negative effects on other species (e.g., changing hydrology of low and high marsh).

7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

7.3.5.16 Lack of proactive management to preserve or maintain viable and functioning marshes for SGCN wildlife.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species (Avg. Score: 2.00)

NJ Specific Threats: 8.1.1.4 Invasive, non-native animals increase the risk of predation on native animals and/or herbivory on native vegetation.

8.1.1.6 Invasive, non-native plants may create physical barriers for some species.

8.1.4 Invasive non-native terrestrial/wetland animals (Avg. Score: 2.00)

NJ Specific Threats: 8.1.4.2 Free-roaming and feral domestic animals such as cats and dogs causes direct mortality of wildlife and disturbance to wildlife breeding and resting areas.

8.1.5 Invasive non-native terrestrial/wetland plants (Avg. Score: 2.00)

NJ Specific Threats: 8.1.5.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.2 Problematic Native Species/Diseases

8.2.1 Unspecified Species (Avg. Score: 2.00)

NJ Specific Threats: 8.2.1.4 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.2.2 Named Species (Avg. Score: 3.00)

NJ Specific Threats: 8.2.2.2 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.5 Viral/Prion-induced Diseases

8.5.2 Named Species (Disease) (Avg. Score: 1.00)

NJ Specific Threats: 8.5.2.1 Diseases such as West Nile Virus, arenavirus, sudden oak death, Avian Influenza, and snake fungal disease cause morbidity or mortality to native populations.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.1 Domestic and Urban Waste Water

9.1.1 Sewage (Avg. Score: 1.00)

NJ Specific Threats: 9.1.1.1 Degradation of aquatic and marine water quality and habitats by changing turbidity, flow and water chemistry.

9.1.1.3 Contaminants in sewage treatment effluents and Combined Sewer Overflows can cause developmental and behavioral abnormalities and reproductive failure in wildlife.

9.1.2 Run-off (Avg. Score: 1.00)

NJ Specific Threats: 9.1.2.2 Contaminants degrade aquatic and marine water quality and can bioaccumulate in benthic organisms, threatening wildlife by causing developmental and behavioral abnormalities and reproductive failure.

9.1.2.3 Contaminants from road runoff (oil, sediment, salt, etc.) impact native vegetation and the species that rely upon them, degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2 Industrial and Military Effluents

9.2.1 Oil Spills (Avg. Score: 1.00)

NJ Specific Threats: 9.2.1.1 Oil spills render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.1.2 Oil spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.1.3 Oil spills cause external oiling of wildlife and ingestion of oil, both of which can injure or kill wildlife.

9.2.3 Other (Avg. Score: 1.00)

NJ Specific Threats: 9.2.3.1 Point and nonpoint source pollution such as polychlorinated biphenyls (PCBs), pesticides, heavy metals, and endocrine disrupting compounds (EDC's) into freshwater and marine systems pose threats to wildlife through direct contact and/or ingestion, and to aquatic species and their predators through bioaccumulation, impacting the reproductive success and neurological function of many avian and fish species.

9.2.3.2 Chemical spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.3.3 Chemical spills may render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.4 Other: Hydrofracturing (Avg. Score: 1.00)

NJ Specific Threats: 9.2.4.1 Contaminants from hydrofracturing degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2.4.2 Uncontrolled effluents escaping from hydrofracturing facilities can cause injury to wildlife and alter normal behaviors.

9.2.5 Other: Industrial toxic settling ponds (Avg. Score: 1.00)

NJ Specific Threats: 9.2.5.1 Surficial or open industrial effluent ponds can cause injury or death to wildlife that become exposed through ingestion or submersion.

9.3 Agricultural and Forestry Effluents

9.3.3 Herbicides and Pesticides (Avg. Score: 2.00)

NJ Specific Threats: 9.3.3.1 Pesticides degrade terrestrial and aquatic habitats, especially streams, ponds and wetlands. Aquatic wildlife are particularly sensitive to these contaminants, which can cause developmental and behavioral abnormalities and reproductive failure. Some contaminants may bioaccumulate in predatory fish and birds and disrupt reproduction.

9.3.3.2 Use of rodenticides can cause secondary actions of injury and death to animals in the course of scavenging.

9.5 Air-Bourne Pollutants

9.5.6 Herbicides and Pesticides (Avg. Score: 1.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

9.6 Excess Energy

9.6.1 Light Pollution (Avg. Score: 1.00)

NJ Specific Threats: 9.6.1.1 Artificial lighting can reduce suitability of adjacent habitat for species sensitive to artificial lights by disorienting wildlife, reducing foraging suitability or success, or increasing visibility to predators, resulting in reduced diversity and/or productivity of species in adjacent habitat.

9.6.3 Noise Pollution (Avg. Score: 2.00)

NJ Specific Threats: 9.6.3.1 Acute and chronic noise pollution in and adjacent to terrestrial and aquatic (marine and freshwater) environments could disrupt normal behaviors of wildlife such as migration, communication, feeding, eluding predators, resting and breeding, etc.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 1.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.2 Droughts

11.2.1 Droughts (Avg. Score: 1.00)

NJ Specific Threats: 11.2.1.3 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

11.3 Temperature Extremes

11.3.1 Temperature extremes (Avg. Score: 2.00)

NJ Specific Threats: 11.3.1.1 Increasing temperatures may cause habitat loss and degradation by desiccating and/or raising the temperatures of small wetlands and streams leading to the loss of freshwater mussels and other aquatic species and species reliant upon these habitats.

11.3.1.2 Increased temperatures can negatively impact wetland, riverine, lacustrine and vernal pool-associated or -dependent wildlife by reducing flows, increasing water temperatures, lowering water levels and causing premature drying of vernal habitats.

11.3.1.3 Temperature extremes of surface water and air degrades marine habitats and ecosystems, threatening marine wildlife. Such extremes also disrupt offshore currents and migratory patterns, species' ranges, and/or impact communities/food chains, all of which further impact the ecosystem.

11.4 Storms and Flooding

11.4.1 Storms and flooding (Avg. Score: 3.00)

NJ Specific Threats: 11.4.1.2 Potentially damage coastal habitats, including beach- and marsh-nesting bird habitats and interdunal wetlands, and can increase marsh erosion.

11.4.1.7 Potentially damage coastal habitats, including beach and marsh habitats used by spawning horseshoe crabs, nesting diamondback terrapins, and resting and foraging birds.

11.4.2 Increased rainfall (Avg. Score: 2.00)

NJ Specific Threats: 11.4.2.2 Extreme rain events can damage wildlife nesting and resting habitats, including impacts to avian eggs and chick and small mammal survivorship.

11.4.2.3 More frequent rain events can alter terrestrial and wetland vegetation communities as well as wetland hydrology, shifting wildlife community use.

11.6 Phenology Shifting or Alteration

11.6.2 Phenology shifts related to predator-prey ecology (Avg. Score: 2.00)

NJ Specific Threats: 11.6.2.1 Alters inter-specific relationships (e.g., competition, parasitism, predation) of wildlife, ultimately leads to detrimental impacts on the ecological system.

11.6.2.2 Shifts timing of species migration, breeding and hibernation, and available food resources, causes redistribution of species, or mortality for species that are unable to relocate due to their already isolated habitat or limited mobility.

11.6.3 Phenology shifts related to species redistribution (Avg. Score: 1.00)

NJ Specific Threats: 11.6.3.1 Shifts in timing of species migration, breeding and hibernation, and available food resources, as a result of wildlife range shifts driven by climate change.

11.6.3.2 Shifts in nesting times or egg incubation durations can limit nest success and longterm populations.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 2.00)

NJ Specific Threats: 12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.1.4 Lack of information on the morphometrics and trends of coastal salt marshes and salt marsh islands.

12.1.1.5 Lack of information regarding the SGCN populations that use managed salt marshes and the best techniques for making improvements for marsh-dependent SGCN wildlife.

12.1.1.6 Lack of information regarding migratory pathways and response of wildlife to lights and noise associated with offshore wind turbines.

12.1.2 Lack of up-to-date existing information (Avg. Score: 3.00)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.2.2 Lack of wildlife monitoring at sites with structures that pose high risk of mortality to SGCN wildlife.

12.1.3 Need to answer research question (Avg. Score: 3.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.3.4 Lack of information regarding the potential short- and long-term impacts of wind turbines and other tall coastal structures on migratory populations.

12.1.4 Need to develop new technique (Avg. Score: 3.00)

NJ Specific Threats: 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.

12.1.4.2 Improve and evaluate survey methods for species not easily detected through standard survey methods.

12.1.4.3 Lack of techniques for high marsh preservation that includes impoundments and elevated islands.

12.1.4.4 Lack of consideration of habitat management opportunities in the course of salt marsh management for mosquito control.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 2.00)

NJ Specific Threats: 12.3.0.1 Regulatory habitat protections within state land use regulations are spatially limited to specific geographic areas (e.g., Pinelands, Coastal Area) or geographic features (e.g., wetlands, streams) and so fail to protect critical habitats that exist outside of these regulated areas.

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 1.00)

NJ Specific Threats: 12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 3.00)

NJ Specific Threats:

14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 1.00)

NJ Specific Threats:

14.2.1.3 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various coastal management practices.

14.2.1.4 Need to develop greater understanding of and support for efforts implemented to maintain disturbance-free habitats that allow coastal wildlife populations to thrive alongside human residential and recreational uses.

14.2.1.5 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various wetland management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 1.00)

NJ Specific Threats:

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.1 Enhance critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates through incentive programs with adjacent private landowners to increase the effective size of the habitat.

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.3 Secure and promote the protection/restoration of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through incentive programs.

1.2.1.6 Secure and promote the protection/restoration of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.14 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of herbicides and pesticides, and implementing more ecologically safe strategies when using such products.

1.2.1.15 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of rodenticides, and implementing more ecologically safe strategies when using such products.

1.2.1.18 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and land managers to control and reduce the impacts of invasive, native and non-native species in order to increase structural habitat diversity.

1.2.1.19 Create incentives for federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to farmers, woodland landowners, and private landowners to adopt and/or endorse consistent BMPs concerning controlled burns to maintain and/or improve wildlife habitat.

1.2.1.20 Coordinate across government agencies and non-government organizations to create or expand upon tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMP's.

1.2.1.21 Create and/or support market-based programs that subsidize or create branding for products derived sustainably from managed wildlife habitats.

1.2.1.22 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to horse/livestock farm owners and managers to increase structural habitat diversity in and around the farms by managing vegetation for a variety of species, in particular, farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

1.2.1.23 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to provide cost shares and/or plan approvals for management based on management approaches and prescriptions.

1.2.1.24 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners, with habitat of suitable patch size to support breeding grassland-dependent species, to alter the timing of vegetation management to benefit grassland and pollinator species.

1.2.1.25 Create incentives (non-monetary and/or monetary) within State regulations to assist and programs to deliver those incentives to aquaculture growers to relocate, for example, from intertidal to subtidal lease areas through buyouts of leases or microloans, and/or promoting on-lease conservation measures used by aquaculture growers (such as the implementation of conservation easements, use of living shorelines, incorporation of BMPs for habitat protection, etc.) for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2 Direct Management of Natural Resources

2.1 Create new habitat or natural processes

2.1.1 Habitat conversion

2.1.1.1 Create high marsh habitat through impoundments and diking of low marsh areas that are less susceptible to breaching by storms and sea-level rise.

2.1.1.2 Utilize dredged materials to create marsh islands to provide nesting habitat for birds and marine turtles.

2.9 Living shorelines

2.9.1 Beach renourishment

2.9.1.2 Coordinate the beneficial placement of dredge materials to create, enhance, and/or maintain colonial waterbird nesting, in particular along the Intra-Coastal Waterway.

2.9.3 Sand dune restoration

2.9.3.1 Prevent or ameliorate near-term impacts of climate change throughout the State but in particular within the coastal and Delaware Bay areas by implementing habitat management strategies that will establish/improve habitat resilience, such as sand dune restoration, that benefits wildlife inhabiting these areas.

2.9.3.2 Implement sand dune restoration strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimizes harm to wildlife, particularly SGCN.

2.9.3.6 Minimize habitat loss of critical coastal dune habitats that provide nesting, migrating, and wintering areas for birds and other coastal species by maintaining or enhancing these areas through sand dune restoration.

2.9.3.9 Enhance critical migratory stopover sand dune habitats for songbirds, raptors, shorebirds, bats and invertebrates through sand dune restoration and expand management to adjacent private lands to increase the effective size of the habitat.

2.9.3.10 Implement sand dune restoration strategies on state and other conservation lands to enhance food availability for migratory species (birds, bats, invertebrates).

2.9.3.11 Conduct sand dune restoration to maintain, enhance and/or create feeding and roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State and evaluate the effectiveness of such management.

2.9.3.12 Implement best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated sand dune habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.2 Improve the availability of prey/food resources through terrestrial and aquatic plantings and habitat restoration for SGCN populations, in particular for those populations thought to be limited due wholly or in part to a lack of (or contaminated) food resources, and for migratory species (birds, bats, invertebrates).

2.10.0.3 Restore and/or enhance habitats to benefit urban-associated SGCN.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.8 Protect significant natural and/or unique communities by implementing best management practices when conducting habitat restoration strategies.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.10 Minimize the loss of important habitats (e.g., coastal scrub-shrub and grassy habitats, high and low marsh habitats, etc.) that provide nesting, migrating, and wintering areas for SGCN birds and other coastal and marsh-dependent species through habitat restoration efforts.

2.10.0.11 Restore and/or enhance critical migratory terrestrial and aquatic habitats (e.g., beach, grasslands, forest, scrub-shrub, etc.) for songbirds, raptors, shorebirds, waterfowl, bats and invertebrates through habitat restoration efforts and expand habitat restoration to adjacent private lands to increase the effective size of the habitat.

2.10.0.13 Restore and/or enhance impoundments to provide suitable foraging and nesting habitat for SGCN species inhabiting them (e.g., bitterns, rails, ducks, turtles and some invertebrates).

2.10.0.21 Restore and/or enhance understory habitats that suppress invasive species and provide critical resources and enhance sheltering, foraging, and nesting cover for wildlife.

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.10.0.23 Restore and/or enhance roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through vegetation management.

2.11.0.6 Reclaim degraded rare species habitats by conducting vegetation management needed to restore habitat value for the documented/target SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.8 Maintain, enhance and/or restore biologically appropriate buffers for SGCN-inhabited/used freshwater wetlands through vegetation management.

2.11.0.9 Minimize habitat loss of critical coastal habitats that provide nesting, migrating, and wintering areas for birds and other coastal species by maintaining or enhancing these areas through vegetation management.

2.11.0.10 Enhance critical migratory stopover beach habitats for songbirds, raptors, shorebirds, bats and invertebrates through vegetation management and expand management to adjacent private lands to increase the effective size of the habitat.

2.11.0.11 Implement vegetation management on state and other conservation lands to enhance food availability for migratory species (birds, bats, invertebrates).

2.11.0.12 Conduct vegetation management to create feeding and roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

2.11.0.13 Implement best management practices (BMPs), protective strategies, and guidelines for vegetation management to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.11.0.15 Implement vegetation management to benefit urban-associated SGCN.

2.11.0.16 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.11.0.22 Minimize habitat loss of high and low marsh habitats that provide nesting, migrating and wintering areas for SGCN birds and other marsh-dependent SGCN by maintaining or enhancing these areas through habitat management and/or revegetation or restoration efforts.

2.11.0.30 Identify and prioritize areas where various management tools (such as increasing salinity through the management of water levels or chemical applications) may be effective in reducing phragmites within and restoring marsh habitat.

2.11.0.32 Increase structural habitat diversity around and when feasible, within agricultural landscapes by managing vegetation for a variety of species, in particular, those farms that have removed scrub-shrub habitat and/or fragmented forests, and by implementing ecologically best practices (e.g., no-till farming, maintaining hedgerows, buffer set-asides, etc.).

2.11.0.33 Increase structural habitat diversity by implementing long-term vegetation management to minimize the potential for the establishment of invasive and/or non-native plants that may outcompete native vegetation.

2.11.0.39 Increase structural habitat diversity in and around solar farms by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.40 Increase structural habitat diversity surrounding areas used for energy, mining, and transportation and service corridors by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides, and avoid managing habitat during the breeding seasons for ground-nesting birds, reptiles, amphibians and small mammals.

2.11.0.44 Manage phragmites adjacent to coastal marshes of interest, in particular those that are within underdeveloped areas and are unprotected, through herbicide application and water management to improve resiliency of the marshes to sea level rise.

2.12 Water management

2.12.1 Ditch plugs

2.12.1.1 Implement best management practices (BMPs), protective strategies, and guidelines for ditch plugging to maintain and enhance healthy, resident and migratory SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.12.2 Diversion/headgate

2.12.2.1 Prevent or ameliorate near-term impacts of climate change throughout the State but in particular within the coastal and Delaware Bay areas by implementing habitat management strategies that will establish/improve habitat resilience, such as using diversions, that benefits wildlife inhabiting these areas.

2.12.6 Tide gate

2.12.6.1 Prevent or ameliorate near-term impacts of climate change throughout the State but in particular within the coastal and Delaware Bay areas by implementing habitat management strategies that will establish/improve habitat resilience, such as tide gates, that benefits wildlife inhabiting these areas.

2.12.7 Waterfowl impoundment maintenance

2.12.7.4 Implement impoundment management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimizes harm to wildlife, particularly SGCN.

2.12.7.8 Repair impoundments damaged by salt hay farm/dike abandonment and conduct restoration of degraded sites for targeted SGCN species and their habitats.

2.12.7.11 Restore existing salt hay farm areas by repairing breaches in impoundments to create habitat for high marsh nesting species and waterfowl.

2.13 Wildlife damage management

2.13.0 Nuisance fish and wildlife damage

2.13.0.1 Investigate the impacts of mosquito control methods on predator SGCN (bats, insectivorous birds). Develop, implement and evaluate the effectiveness of mosquito control-BMPs designed to avoid depletion or contamination of SGCN's insect prey base and drinking sources with pyrethroids, organophosphates, or other chemicals.

2.13.0.3 Investigate alternative saltmarsh mosquito control methods that may produce benefits for coastal marsh dependent SGCN wildlife, including but not limited to high-marsh nesting birds and migrating shorebirds and landbirds.

2.13.0.5 Investigate the impacts of human-subsidized and/or naturally occurring predator species on SGCN to assess the need for integrated wildlife damage management techniques (e.g., predator exclosures, fish blockages, electric fence, culls) and/or policy changes on state land management that minimize the impacts of human-subsidized predators.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.6 Conduct long-term studies on resident and migratory SGCN to determine if there are changes to the populations' demography (productivity, survival, dispersal) and/or to their critical and/or supporting habitats (i.e., diminishing in value, acreage or connectivity, etc.), in particular changes that would not maintain SGCN at viable levels for species populations. Update data and GIS maps; provide updated information to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.16 Develop a baseline status (through studies and assessments, review of available data, enlistment of species experts, etc.) of marsh- and beach-dependent SGCN (and their habitats) whose populations may be impaired due to habitat degradation as a result of salt hay farm/dike abandonment.

3.0.0.17 Conduct long-term monitoring of marsh- and beach-dependent SGCN (and their habitats) to evaluate the effectiveness of the management strategies implemented to repair degraded marshes and beaches damaged by salt hay farm/dike abandonment within all bay shore areas.

3.0.0.25 Identify pathways of migratory SGCN in the Atlantic Coastal and Marine Regions (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and use the data to help evaluate the potential short- and long-term impacts of wind turbines, radio towers, utility guy lines, and other tall coastal structures on migratory populations.

3.0.0.30 Conduct research to investigate the feasibility of managing and/or creating roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

3.0.0.31 Conduct short- and long-term studies (e.g., wildlife surveys and habitat assessments) to evaluate the effectiveness of vegetation management efforts to maintain, enhance and/or create roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.2 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.0.5 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

3.2.0.17 Conduct monitoring at constructed wind farms (within or outside of NJ) to assess the impacts on migratory species (birds, bats, insects) and determine if NJ's land use planning efforts and/or smart-growth plans need to be revised.

3.2.0.20 Evaluate the effectiveness of BMPs for mosquito control methods that may produce benefits for coastal marsh dependent SGCN wildlife, including but not limited to high-marsh nesting birds and migrating shorebirds and landbirds.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.2 Age, size and sex structure

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.3 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) remaining high and low marsh habitats with natural buffers and stable water levels that provide suitable habitat for SGCN and marsh habitats that would benefit from restoration. Conduct research to assess their condition for nesting, migrating and wintering birds.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.14 Compile information (obtained through literature reviews, communication with other States along the Atlantic coast, academia, etc.) regarding the impacts of above water operation of wind turbines on migratory marine birds and bats. Provide data to appropriate governing agencies and/or State commissions for integration into permitting review processes.

3.3.1.16 Gather "best information" for spatial modeling and update/create a current model/depiction of anticipated habitat shifts from sea-level rise, flooding, etc.

3.3.1.21 Conduct comprehensive baseline surveys of all marsh islands; surveys to include, but are not limited to, documented elevations, and assessments of the habitat's current condition and vulnerability of dependent SGCN species in relation to the increased inundation rate.

3.3.1.22 Identify, assess and prioritize marsh habitats for restoration where various management tools (such as increasing salinity through the management of water levels or chemical applications) may be effective in reducing the presence of phragmites.

3.3.1.23 Identify areas (through surveys/studies, predictive modeling, review of available data, enlistment of habitat management and/or species experts, etc.) where the State can allow coastal marsh migration due to sea level rise, and target these areas for land acquisition and/or land management to accommodate this transition. Targeted areas should include underdeveloped areas adjacent to unprotected coastal marshes.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.1.28 Identify key habitats for the potential allowance of natural coastal processes without interfering through shoreline stabilization, etc. and evaluate the risks and benefits if coastal migration was permitted to occur naturally. Create a GIS map of the identified areas; provide the assessment and mapping to local towns and other appropriate governing agencies.

3.3.1.29 Identify coastal wildlife habitats unimpacted by development and/or at greatest risk of habitat loss to help guide enlightened coastal stabilization efforts (i.e., use of soft stabilization) to reduce the impacts on wildlife and their habitats.

3.3.2 Monitoring

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.6 Investigate the effectiveness and potential impacts of marsh management techniques by studying the effects of Open Marsh Water Management on wildlife species, in particular high marsh nesting birds and waterfowl. Evaluate best management practices as appropriate.

3.3.2.7 Conduct studies on land use practices such as ditching, impounding, dredging, open marsh water management, burning, and marsh restoration to evaluate the effectiveness and potential impacts on marsh-dependent SGCN.

3.3.2.11 Evaluate and compare the effectiveness of delayed mowing of warm season grass fields versus cool season hay fields to benefit grassland-dependent species.

3.3.2.12 Evaluate and compare the effectiveness of different management techniques (e.g., prescribed burning, mowing, brush-hogging, etc.) for maintaining suitable habitat for grassland-dependent species and species dependent upon early successional habitats.

3.3.2.13 Evaluate the effectiveness of management strategies (e.g., timing restrictions for mowing, cooperative agreements with utility companies for maintenance of rights-of-ways) that maintain and enhance large existing areas of grassland in perpetuity. Focus on habitat patches that can be managed to enhance the total size of suitable grassland habitat and create interspersed early-successional habitat.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.3.2.19 Once baseline data on the marsh islands' and associated SGCN species' vulnerability to inundation is completed, continue to conduct long-term monitoring the islands to determine sustainability for wildlife dependent on these areas.

3.3.2.21 Develop, implement and evaluate the effectiveness of management strategies use to restore marsh habitat (e.g., phragmites reduction).

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.4 Modify best management practices of Open Marsh Water Management based on evaluation of the effectiveness and potential impacts of marsh management techniques on wildlife species, in particular high marsh nesting birds and waterfowl.

3.5.3.6 Develop/improve management strategies to repair marshes and associated beaches damaged by salt hay farm/dike abandonment for all bay shore areas currently degraded.

3.5.3.8 Develop best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5.3.14 Develop aquaculture practices in the coastal areas that are compatible with the recovery of SGCN.

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.3.17 Investigate and improve marsh management techniques to benefit critical wildlife species, in particular high marsh nesting birds and waterfowl.

3.5.3.18 Develop recommendations to improve methods on land use practices such as ditching, impounding, dredging, open marsh water management, burning, and marsh restoration based on potential impacts on marsh-dependent SGCN.

3.5.3.22 Identify (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) and modify management strategies (e.g., timing restrictions for mowing, cooperative agreements with utility companies for maintenance of rights-of-ways), based on research, that maintain and enhance large existing areas of grassland in perpetuity.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.3 Investigate alternative saltmarsh mosquito control methods that may produce benefits for coastal marsh dependent SGCN wildlife, including but not limited to high-marsh nesting birds and migrating shorebirds and landbirds.

3.5.4.10 Develop BMPs for lighting of/on tall structures that minimize harm to and/or disorientation of wildlife, in particular but not limited to migratory birds, bats and invertebrates.

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.17 Investigate new, non-invasive techniques for SGCN population evaluation through literature review, expert opinion, trial studies (if low risk), etc.

3.5.4.18 Investigate the effectiveness of survey techniques through selected “ground truthing” and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.1 Enhance and increase the effective size of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates by securing adjacent habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.3 Secure and protect riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.5 Secure and protect critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.1 Promote the protection of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates and enhance these lands by increasing the effective size through conservation area designations of stopover habitats and adjacent private lands.

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.5 Promote the protection of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through conservation area designations.

7 Law Enforcement

7.1 Law enforcement

7.1.4 Scale Unspecified

7.1.4.4 Improve enforcement of policies/regulations aimed at protecting and preserving critical coastal and marsh habitats, and secure mitigation for losses that create an environmental benefit.

7.1.4.5 Enforce current policies and/or regulations to increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal SGCN, and implement and enforce amended policies/regulations.

7.1.4.8 Implement policies that protect critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates.

7.1.4.10 Implement policies that promotes expanding acreages and enhances the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

7.1.4.11 Implement and enforce policies/regulations that will increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.21 Implement regulations for lighting of/on tall structures that will minimize harm to and/or disorientation of wildlife, and enforce within state, county and local permitting processes.

7.1.4.22 Implement policies and/or regulations that prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.2 Develop a team of personnel from government entities, conservation organizations and other stakeholders engaged in oil/gas spill response for marine and freshwater habitats to develop a feasible plan for oil spill response and/or to amend NJ's current oil spill response plan that clearly outlines each organizations responsibilities and an assessment and location list of available equipment for boom deployment during oil spills.

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.1.0.15 Engage government agencies, conservation partners and other stakeholders in discussions encouraging and supporting the creation of laws and policies requiring vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.42 Engage citizens, wildlife observers and photographers through discussions and distributable information regarding the importance of and encouraging implementing responsible and ethical behavior when observing wildlife by developing an alliance of wildlife photographers and widely circulating recommendations on how to reduce impact.

8.1.0.45 Form cooperative partnerships with airports and airline companies to facilitate habitat creation away from airports and outside of flight patterns, and to identify seasonal wildlife strike risks to determine if seasonal shifts in flight patterns will minimize this risk.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.6 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners, land managers and local communities to discourage the presence of managed cat colonies and trap, neuter and release programs in wildlife habitats.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.21 Develop an educational outreach program for the general public, in particular those within and adjacent to coastal and riparian areas on the realities of sea-level rise to help citizens living in these areas understand how this will affect them, how coastal stabilization negatively impacts wildlife by preventing natural processes, and how their decisions impact species.

8.3.0.28 Develop educational outreach programs for public and private landowners and land managers regarding the importance of managing grasslands for grassland-dependent species, methods of management, and/or incentive programs available.

8.3.0.31 Develop an educational outreach program for landowners and citizens on the secondary impacts of rodenticides on predators and scavengers.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.6 Amend NJ's current oil spill response plan to 1) expand the geographic area addressed, 2) expand the targeted species impacted and in need of recovery, and 3) revise current and integrate new actions into the plan as needed.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.15 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.1.17 Evaluate the potential benefits to high marsh species (such as Black Rail and Northern Harrier) by restoring salt hay farms along Delaware Bay.

9.3.2 Listed species recovery planning

9.3.2.1 Develop proactive species recovery plans for all endangered and threatened species including guidance and objectives pertaining to critical and supporting habitat to meet and maintain recovery goals.

9.3.3 Habitat management planning

9.3.3.4 Create habitat restoration plans to repair marshes and associated beaches damaged by salt hay farm/dike abandonment for all bay shore areas currently degraded.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.13 Develop a management plan that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas and prevents or ameliorates near-term impacts of climate change throughout the State, but in particular within the coastal and Delaware Bay areas.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.20 Develop an action plan for immediate implementation should habitat levels fall below the minimum necessary size and/or structure within the Cape May Peninsula to sustain the avian migration.

9.3.3.25 Develop a habitat management plan focused on areas important to near-shore, coastal species (e.g., herring, sturgeon, terrapin, nesting birds) that prioritizes these areas to direct resources to minimize the impacts of sea-level rise, flooding and storms (including extreme rain events) such as increased erosion of beach, mudflat and marsh habitats, and the increased risk of saltwater intrusion into freshwater habitats. Gather "best information" for spatial modeling of anticipated habitat shifts from sea-level rise, flooding, etc.

9.3.3.26 Develop a management plan for parcels of suitable size to be managed for native herbaceous plant species that support breeding grassland dependent species.

9.3.3.31 Using data from baseline inventory and monitoring of all current marsh islands and their vulnerability to inundation as a result of sea level rise, create a plan to delineate each island's ideal fit for habitat management (e.g., restoration, hasting, dredging). Planning will factor in criteria to designate which islands should be maintained or restored, and which will be passively allowed to submerge.

9.3.3.33 Evaluate the potential benefits to increasing high marsh habitat by restoring salt hay farms along Delaware Bay.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.3 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.6 Review all projects to be conducted in or adjacent to coastal wetlands and marshes, and provide recommendations on how to best avoid or reduce human disturbance at nesting areas (for example, timing restrictions) and actions not permitted.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.11 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed offshore energy projects relating to drilling, extraction and distribution of petroleum and gas products to reduce habitat destruction and minimize impacts on wildlife.

11.1.1.12 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed solar farm projects to reduce habitat fragmentation and minimize impacts on wildlife.

11.1.1.13 Use the best available science (species data, habitat present, wind farm layout options, wind blade impacts on migratory species, location of migration routes, etc.) when conducting regulatory reviews of proposed wind farm projects to minimize impacts on migratory and resident wildlife and reduce habitat fragmentation.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.4 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the secondary impacts of rodenticides on predators and scavengers.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.12 Provide educational resources and technical support to public landowners and land managers for managing grasslands for grassland-dependent species.

11.2.0.20 Provide educational resources and technical support to public and private landowners and land managers to promote the protection and/or enhancement of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN.

11.2.0.21 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates to promote the protection and/or enhancement of those adjacent habitats to increase the effective size of the migratory habitat.

11.2.0.23 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to SGCN habitats to promote the protection and/or enhancement of those adjacent habitats to increase the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and that connect conserved SGCN habitats.

11.2.0.24 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers on how to manage vegetated roadside areas (e.g., mowing, brush-hogging, etc.) on a schedule that avoids peak activity periods for wildlife and therefore, minimizes harm.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.2 With private landowners

11.2.2.1 Provide technical support to farming operations and woodland landowners on ways to decrease clean farming (edge-to-edge) practices and create ecotones to benefit bobwhite and other species dependent on early successional habitat.

100 Law and Policy

100. Legislation

100.1.2 National Level

100.1.2.1 Create legislation to establish markets for warm-season grasses to increase the permanency of this crop on the landscape.

100.1.3 Sub-national Level

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.4 County and Local

100.1.4.1 Enhance critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates through the local ordinances of adjacent private lands to increase the effective size of the habitat.

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.8 Secure critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through local ordinances.

100.1.4.13 Encourage municipal laws regulating domestic pets that may predate on wildlife.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.2 Improve policies/regulations aimed at protecting and preserving critical coastal and marsh habitats and securing mitigation for losses that create an environmental benefit.

100.3.0.3 Develop policies that will promote the long term protection of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates.

100.3.0.7 Amend current policies and/or regulations to increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.19 Develop regulations for lighting of/on tall structures that will minimize harm to and/or disorientation of wildlife, in particular but not limited to migratory birds, bats and invertebrates. Implement BMPs into state, county and local permitting processes.

100.3.0.20 Develop policies and/or regulations that prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

100.3.0.23 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.24 Create legislation to establish markets for warm-season grasses to increase the permanency of this crop on the landscape.

100.3.0.40 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.48 Propose new State law or regulation mandating that a State-level "development impact fee" be assessed on all new development approved by municipalities (via the Municipal Land Use Law processes), and dedicate such monies to the development and implementation of regional Habitat Conservation Plans (or existing plans/programs serving the same regional function).

100.3.0.49 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address the issue of disturbance to habitat or species as a result of human activities (e.g., construction, bridge maintenance, road work, etc.).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.56 Develop regulations that when implemented will protect critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates.

100.3.0.58 Develop regulations that when implemented will promote the expansion of acreages and enhancement of the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.59 Develop regulations that when implemented will increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.67 Develop regulations for lighting of/on tall structures that will minimize harm to and/or disorientation of wildlife, and enforce within state, county and local permitting processes.

100.3.0.68 Develop regulations that when implemented will prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.2 Create a policy that requires the NJ DEP to incorporate scientific information regarding climate change and sea level rise (e.g., predictions, habitat management/acquisition efforts to enhance resilience to inundation) on their websites and to work with other government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

100.4.0.3 Develop policies for mandatory buffer strips on preserved farmlands and state-owned agricultural lands.

100.4.0.12 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.4.0.14 Develop policies to facilitate agreements between eligible entities to manage appropriate conserved lands for grassland-dependent species, and to have access to/obtain restoration funds.

100.4.0.17 Develop policies to implement habitat management strategies, including prescribed burns, that will increase the structural diversity on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies to control and reduce the impacts of invasive, non-native species in order to increase structural habitat diversity.

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Peregrine Falcon

Focal species that comprise this Conservation Target:

Peregrine Falcon

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.2 Residential development using materials that cause collision hazards (Avg. Score: 1.00)

NJ Specific Threats: 1.1.2.1 Collision risk to volant species (birds, bats and invertebrates).

1.2 Commercial and Industrial Areas

1.2.2 Commercial development using materials that cause collision hazards (Avg. Score: 2.00)

NJ Specific Threats: 1.2.2.1 Collision risk to volant species (birds, bats and invertebrates).

3 Energy Production and Mining

3.1 Oil and Gas Facilities and Pipelines

3.1.1 Distribution processes of petroleum and other liquid hydrocarbons (Avg. Score: 1.00)

NJ Specific Threats: 3.1.1.1 Fragments terrestrial and aquatic habitats.

3.1.1.2 Loss, alteration and/or degradation of habitat.

3.1.1.3 Increased risk of oil spills.

3.1.1.4 Increased noise pollution.

3.1.2 Natural gas distribution processes (Avg. Score: 1.00)

NJ Specific Threats: 3.1.2.1 Fragments terrestrial and aquatic habitats.

3.1.2.2 Loss, alteration and/or degradation of habitat.

3.2 Mining and Quarrying

3.2.2 Surface Mining - Rock Quarry (and sand quarries) (Avg. Score: 1.00)

NJ Specific Threats: 3.2.2.1 Fragments terrestrial and aquatic habitats.

3.2.2.2 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

3.3 Renewable Energy

3.3.1 Wind Power (Avg. Score: 2.00)

NJ Specific Threats: 3.3.1.1 Turbines, blades, and structure foundations create a collision risk to volant species (birds, bats and invertebrates) and marine animals.

3.3.1.3 Loss, alteration and/or degradation of habitat.

3.3.2 Solar Power (Avg. Score: 1.00)

NJ Specific Threats: 3.3.2.1 Fragments terrestrial habitats.

3.3.2.2 Loss, alteration and/or degradation of habitat.

3.4 Conventional Power Plants

3.4.0 Conventional Power Plants (Avg. Score: 1.00)

NJ Specific Threats: 3.4.0.1 Methane flares cause injuries and mortality to birds perching on stacks.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.1.2 Movement of cars and other vehicles on roads and railroads (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 4.1.2.1 Increased vehicle traffic increases the risk of wildlife mortality from strikes.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads (Avg. Score: 1.00)

NJ Specific Threats: 4.2.1.3 Powerline structures attract perching raptors, increasing the risk of raptor electrocution.

4.2.1.5 Tall radio and utility towers with guy lines pose a strike hazard for migrant bats and birds, especially in poor visibility conditions (e.g., fog, nighttime, poor weather conditions).

4.4 Flight Paths

4.4.1 Airplane flight paths (Avg. Score: 2.00)

NJ Specific Threats: 4.4.1.2 Increased risk of collision between airplanes and birds, bats and insects.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.2 Boating (Avg. Score: 2.00)

NJ Specific Threats: 6.1.2.2 Increased disturbance to marine animals and ocean-, bay- and marsh-associated birds which can alter their behavior decreasing the likelihood of their success and/or reproduction.

6.1.5 Wildlife observation and photography (Avg. Score: 2.00)

NJ Specific Threats: 6.1.5.1 Improperly conducted recreational activities may disrupt normal wildlife behaviors which can result in reduced reproductive success or survival, abandonment of critical sites, etc.

6.1.5.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.1.6 Recreational use of cliffs, rocks and ridgelines (Avg. Score: 2.00)

NJ Specific Threats: 6.1.6.1 Recreational rock-climbing and rock-scrambling can cause reduced reproductive success or reproductive failure for wildlife by disrupting normal reproductive behaviors and/or reduce breeding success by forcing them into suboptimal habitats.

6.1.7 Other (Avg. Score: 1.00)

NJ Specific Threats: 6.1.7.1 Use of recreational or commercial pyrotechnics may cause temporary disturbance to wildlife, in particular to nesting birds.

6.1.7.3 Drone use in areas with sensitive wildlife (e.g., nesting and foraging birds, migrating and foraging/feeding whales) can alter their behavior and can cause disturbance that impacts their reproductive and/or foraging success.

6.2 Military Exercises

6.2.1 Military exercises (Avg. Score: 1.00)

NJ Specific Threats: 6.2.1.1 Military testing and training exercises may inflict disturbance and potential physical harm to wildlife.

6.3 Work and Other Activities

6.3.3 Other "work" unrelated to research (Avg. Score: 2.00)

NJ Specific Threats: 6.3.3.1 Construction projects may disrupt normal wildlife behavior which can result in reduced reproductive success or survival, abandonment of critical sites, etc. (e.g., bridge-nesting birds).

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.4 Invasive non-native terrestrial/wetland animals (Avg. Score: 1.00)

NJ Specific Threats: 8.1.4.2 Free-roaming and feral domestic animals such as cats and dogs causes direct mortality of wildlife and disturbance to wildlife breeding and resting areas.

8.2 Problematic Native Species/Diseases

8.2.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.2.1.2 Invasive pathogens and insects may increase in range and abundance as limiting factors (such as temperature) are altered as a result of climate change.

8.2.1.4 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.2.2 Named Species (Avg. Score: 1.00)

NJ Specific Threats: 8.2.2.2 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.5 Viral/Prion-induced Diseases

8.5.2 Named Species (Disease) (Avg. Score: 2.00)

NJ Specific Threats: 8.5.2.1 Diseases such as West Nile Virus, arenavirus, sudden oak death, Avian Influenza, and snake fungal disease cause morbidity or mortality to native populations.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.1 Domestic and Urban Waste Water

9.1.1 Sewage (Avg. Score: 1.00)

NJ Specific Threats: 9.1.1.1 Degradation of aquatic and marine water quality and habitats by changing turbidity, flow and water chemistry.

9.1.1.3 Contaminants in sewage treatment effluents and Combined Sewer Overflows can cause developmental and behavioral abnormalities and reproductive failure in wildlife.

9.1.2 Run-off (Avg. Score: 1.00)

NJ Specific Threats: 9.1.2.2 Contaminants degrade aquatic and marine water quality and can bioaccumulate in benthic organisms, threatening wildlife by causing developmental and behavioral abnormalities and reproductive failure.

9.2 Industrial and Military Effluents

9.2.1 Oil Spills (Avg. Score: 1.00)

NJ Specific Threats: 9.2.1.2 Oil spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.1.3 Oil spills cause external oiling of wildlife and ingestion of oil, both of which can injure or kill wildlife.

9.2.3 Other (Avg. Score: 2.00)

NJ Specific Threats: 9.2.3.1 Point and nonpoint source pollution such as polychlorinated biphenyls (PCBs), pesticides, heavy metals, and endocrine disrupting compounds (EDC's) into freshwater and marine systems pose threats to wildlife through direct contact and/or ingestion, and to aquatic species and their predators through bioaccumulation, impacting the reproductive success and neurological function of many avian and fish species.

9.2.4 Other: Hydrofracturing (Avg. Score: 1.00)

NJ Specific Threats: 9.2.4.1 Contaminants from hydrofracturing degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2.4.2 Uncontrolled effluents escaping from hydrofracturing facilities can cause injury to wildlife and alter normal behaviors.

9.2.5 Other: Industrial toxic settling ponds (Avg. Score: 1.00)

NJ Specific Threats: 9.2.5.1 Surficial or open industrial effluent ponds can cause injury or death to wildlife that become exposed through ingestion or submersion.

9.3 Agricultural and Forestry Effluents

9.3.3 Herbicides and Pesticides (Avg. Score: 2.00)

NJ Specific Threats: 9.3.3.1 Pesticides degrade terrestrial and aquatic habitats, especially streams, ponds and wetlands. Aquatic wildlife are particularly sensitive to these contaminants, which can cause developmental and behavioral abnormalities and reproductive failure. Some contaminants may bioaccumulate in predatory fish and birds and disrupt reproduction.

9.3.3.2 Use of rodenticides can cause secondary actions of injury and death to animals in the course of scavenging.

9.5 Air-Bourne Pollutants

9.5.5 Methane (Avg. Score: 1.00)

NJ Specific Threats: 9.5.5.1 Emission contributes to global warming and climate change.

9.5.6 Herbicides and Pesticides (Avg. Score: 1.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

9.6 Excess Energy

9.6.1 Light Pollution (Avg. Score: 1.00)

NJ Specific Threats: 9.6.1.1 Artificial lighting can reduce suitability of adjacent habitat for species sensitive to artificial lights by disorienting wildlife, reducing foraging suitability or success, or increasing visibility to predators, resulting in reduced diversity and/or productivity of species in adjacent habitat.

9.6.3 Noise Pollution (Avg. Score: 1.00)

NJ Specific Threats: 9.6.3.1 Acute and chronic noise pollution in and adjacent to terrestrial and aquatic (marine and freshwater) environments could disrupt normal behaviors of wildlife such as migration, communication, feeding, eluding predators, resting and breeding, etc.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 1.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.2 Droughts

11.2.1 Droughts (Avg. Score: 1.00)

NJ Specific Threats: 11.2.1.1 Contribute to hardened soils, decreasing water recharge during rains and increasing the likelihood of flash floods during storms.

11.2.1.2 Lead to lower groundwater levels and therefore, less available water for people and habitats.

11.2.1.3 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

11.3 Temperature Extremes

11.3.1 Temperature extremes (Avg. Score: 1.00)

NJ Specific Threats: 11.3.1.3 Temperature extremes of surface water and air degrades marine habitats and ecosystems, threatening marine wildlife. Such extremes also disrupt offshore currents and migratory patterns, species' ranges, and/or impact communities/food chains, all of which further impact the ecosystem.

11.4 Storms and Flooding

11.4.1 Storms and flooding (Avg. Score: 3.00)

NJ Specific Threats: 11.4.1.2 Potentially damage coastal habitats, including beach- and marsh-nesting bird habitats and interdunal wetlands, and can increase marsh erosion.

11.4.1.7 Potentially damage coastal habitats, including beach and marsh habitats used by spawning horseshoe crabs, nesting diamondback terrapins, and resting and foraging birds.

11.4.2 Increased rainfall (Avg. Score: 1.00)

NJ Specific Threats: 11.4.2.2 Extreme rain events can damage wildlife nesting and resting habitats, including impacts to avian eggs and chick and small mammal survivorship.

11.6 Phenology Shifting or Alteration

11.6.2 Phenology shifts related to predator-prey ecology (Avg. Score: 1.00)

NJ Specific Threats: 11.6.2.1 Alters inter-specific relationships (e.g., competition, parasitism, predation) of wildlife, ultimately leads to detrimental impacts on the ecological system.

11.6.2.2 Shifts timing of species migration, breeding and hibernation, and available food resources, causes redistribution of species, or mortality for species that are unable to relocate due to their already isolated habitat or limited mobility.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.2 Lack of up-to-date existing information (Avg. Score: 2.00)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.2.2 Lack of wildlife monitoring at sites with structures that pose high risk of mortality to SGCN wildlife.

12.1.3 Need to answer research question (Avg. Score: 1.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.3.4 Lack of information regarding the potential short- and long-term impacts of wind turbines and other tall coastal structures on migratory populations.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 1.00)

NJ Specific Threats: 12.3.0.1 Regulatory habitat protections within state land use regulations are spatially limited to specific geographic areas (e.g., Pinelands, Coastal Area) or geographic features (e.g., wetlands, streams) and so fail to protect critical habitats that exist outside of these regulated areas.

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 1.00)

NJ Specific Threats: 12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 1.00)

NJ Specific Threats: 14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 1.00)

NJ Specific Threats: 14.2.1.3 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various coastal management practices.

14.2.1.4 Need to develop greater understanding of and support for efforts implemented to maintain disturbance-free habitats that allow coastal wildlife populations to thrive alongside human residential and recreational uses.

14.2.1.5 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various wetland management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 1.00)

NJ Specific Threats: 15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.6 Secure and promote the protection/restoration of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers through incentive programs.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.15 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of rodenticides, and implementing more ecologically safe strategies when using such products.

2 Direct Management of Natural Resources

2.1 Create new habitat or natural processes

2.1.1 Habitat conversion

2.1.1.1 Create high marsh habitat through impoundments and diking of low marsh areas that are less susceptible to breaching by storms and sea-level rise.

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.5 Implement biologically safe and appropriate control/management strategies, and where appropriate, eradication strategies to reduce the impacts and/or limit the distribution of invasive and/or non-native plant species within or near aquatic systems using methods that will provide the most protection to the aquatic and riparian ecological system, and minimize disturbance to the soil and wildlife. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.9 Living shorelines

2.9.3 Sand dune restoration

2.9.3.1 Prevent or ameliorate near-term impacts of climate change throughout the State but in particular within the coastal and Delaware Bay areas by implementing habitat management strategies that will establish/improve habitat resilience, such as sand dune restoration, that benefits wildlife inhabiting these areas.

2.9.3.6 Minimize habitat loss of critical coastal dune habitats that provide nesting, migrating, and wintering areas for birds and other coastal species by maintaining or enhancing these areas through sand dune restoration.

2.9.3.9 Enhance critical migratory stopover sand dune habitats for songbirds, raptors, shorebirds, bats and invertebrates through sand dune restoration and expand management to adjacent private lands to increase the effective size of the habitat.

2.9.3.10 Implement sand dune restoration strategies on state and other conservation lands to enhance food availability for migratory species (birds, bats, invertebrates).

2.9.3.11 Conduct sand dune restoration to maintain, enhance and/or create feeding and roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State and evaluate the effectiveness of such management.

2.9.3.12 Implement best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated sand dune habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.2 Improve the availability of prey/food resources through terrestrial and aquatic plantings and habitat restoration for SGCN populations, in particular for those populations thought to be limited due wholly or in part to a lack of (or contaminated) food resources, and for migratory species (birds, bats, invertebrates).

2.10.0.3 Restore and/or enhance habitats to benefit urban-associated SGCN.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.10 Minimize the loss of important habitats (e.g., coastal scrub-shrub and grassy habitats, high and low marsh habitats, etc.) that provide nesting, migrating, and wintering areas for SGCN birds and other coastal and marsh-dependent species through habitat restoration efforts.

2.10.0.11 Restore and/or enhance critical migratory terrestrial and aquatic habitats (e.g., beach, grasslands, forest, scrub-shrub, etc.) for songbirds, raptors, shorebirds, waterfowl, bats and invertebrates through habitat restoration efforts and expand habitat restoration to adjacent private lands to increase the effective size of the habitat.

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.23 Restore and/or enhance roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.6 Reclaim degraded rare species habitats by conducting vegetation management needed to restore habitat value for the documented/target SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.10 Enhance critical migratory stopover beach habitats for songbirds, raptors, shorebirds, bats and invertebrates through vegetation management and expand management to adjacent private lands to increase the effective size of the habitat.

2.11.0.11 Implement vegetation management on state and other conservation lands to enhance food availability for migratory species (birds, bats, invertebrates).

2.11.0.13 Implement best management practices (BMPs), protective strategies, and guidelines for vegetation management to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.11.0.15 Implement vegetation management to benefit urban-associated SGCN.

2.11.0.16 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.11.0.22 Minimize habitat loss of high and low marsh habitats that provide nesting, migrating and wintering areas for SGCN birds and other marsh-dependent SGCN by maintaining or enhancing these areas through habitat management and/or revegetation or restoration efforts.

2.12 Water management

2.12.6 Tide gate

2.12.6.1 Prevent or ameliorate near-term impacts of climate change throughout the State but in particular within the coastal and Delaware Bay areas by implementing habitat management strategies that will establish/improve habitat resilience, such as tide gates, that benefits wildlife inhabiting these areas.

2.14 Wildlife disease management

2.14.0 Wildlife disease strategy development and investigation

2.14.0.4 Conduct long-term monitoring of diseases in vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.6 Conduct long-term studies on resident and migratory SGCN to determine if there are changes to the populations' demography (productivity, survival, dispersal) and/or to their critical and/or supporting habitats (i.e., diminishing in value, acreage or connectivity, etc.), in particular changes that would not maintain SGCN at viable levels for species populations. Update data and GIS maps; provide updated information to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.12 Compile available life history information on urban-associated SGCN (e.g., predators, levels of nest/young depredation, breeding longevity and reproductive effort over time, preferred nesting/reproductive requirements, fidelity to breeding and wintering sites, comprehensive assessment of migration routes and destinations) for future development of management strategies to benefit such species.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.25 Identify pathways of migratory SGCN in the Atlantic Coastal and Marine Regions (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and use the data to help evaluate the potential short- and long-term impacts of wind turbines, radio towers, utility guy lines, and other tall coastal structures on migratory populations.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.2 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.0.4 Conduct long-term monitoring of the impacts of contaminants to vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.2.0.17 Conduct monitoring at constructed wind farms (within or outside of NJ) to assess the impacts on migratory species (birds, bats, insects) and determine if NJ's land use planning efforts and/or smart-growth plans need to be revised.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.14 Compile information (obtained through literature reviews, communication with other States along the Atlantic coast, academia, etc.) regarding the impacts of above water operation of wind turbines on migratory marine birds and bats. Provide data to appropriate governing agencies and/or State commissions for integration into permitting review processes.

3.3.1.16 Gather "best information" for spatial modeling and update/create a current model/depiction of anticipated habitat shifts from sea-level rise, flooding, etc.

3.3.1.21 Conduct comprehensive baseline surveys of all marsh islands; surveys to include, but are not limited to, documented elevations, and assessments of the habitat's current condition and vulnerability of dependent SGCN species in relation to the increased inundation rate.

3.3.2 Monitoring

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.16 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.6 Investigate the feasibility of mitigating for the impacts of contaminants to vulnerable wildlife, particularly SGCN. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.5.4.13 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.5 Secure and protect critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

7 Law Enforcement

7.1 Law enforcement

7.1.4 Scale Unspecified

7.1.4.3 Increase law enforcement presence proximate to sensitive areas [e.g., avian nesting sites, in particular rookeries, and reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively)] to deter human activity and subsequent disturbance to SGCN.

7.1.4.7 Increase law enforcement presence to enforce regulations governing recreational activities (e.g., the use of personal watercraft and off road vehicles, caving, rock climbing, etc.) on conserved lands and within other sensitive habitats, and discourage activities that cause harm or disturbance to vegetation, wetlands, fish and wildlife.

7.1.4.24 Implement protective measures to benefit urban-associated SGCN such as restricting human access, buffering sensitive areas with postings, noise and/or light restrictions in sensitive areas and/or during sensitive periods such as breeding, etc.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.28 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting sportsmen's organizations, as well as public constituents, addressing the unintended hazard of lead-shot on wildlife, in particular scavengers.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.42 Engage citizens, wildlife observers and photographers through discussions and distributable information regarding the importance of and encouraging implementing responsible and ethical behavior when observing wildlife by developing an alliance of wildlife photographers and widely circulating recommendations on how to reduce impact.

8.2 Recruitment and retention activities

8.2.3 For wildlife watching

8.2.3.1 Develop and implement nature-focused tourism opportunities including wildlife viewing sites, interpretive signage highlighting unique ecosystems/habitats, and wildlife-related recreational opportunities that do not negatively impact SGCN or their habitats.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.20 Use compiled life history information on urban-associated SGCN regarding threats, breeding, fecundity, survival, habitat needs, wintering sites/roosts, migration routes and destinations, etc. to develop wildlife management strategies to benefit such species.

9.3.2 Listed species recovery planning

9.3.2.1 Develop proactive species recovery plans for all endangered and threatened species including guidance and objectives pertaining to critical and supporting habitat to meet and maintain recovery goals.

9.3.3 Habitat management planning

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.13 Develop a management plan that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas and prevents or ameliorates near-term impacts of climate change throughout the State, but in particular within the coastal and Delaware Bay areas.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.16 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.3.20 Develop an action plan for immediate implementation should habitat levels fall below the minimum necessary size and/or structure within the Cape May Peninsula to sustain the avian migration.

9.3.3.38 Use compiled life history information on urban-associated SGCN regarding threats, breeding, fecundity, survival, habitat needs, wintering sites/roosts, migration routes and destinations, etc. to develop habitat management strategies to benefit such species.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.3 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.6 Review all projects to be conducted in or adjacent to coastal wetlands and marshes, and provide recommendations on how to best avoid or reduce human disturbance at nesting areas (for example, timing restrictions) and actions not permitted.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.13 Use the best available science (species data, habitat present, wind farm layout options, wind blade impacts on migratory species, location of migration routes, etc.) when conducting regulatory reviews of proposed wind farm projects to minimize impacts on migratory and resident wildlife and reduce habitat fragmentation.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.4 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the secondary impacts of rodenticides on predators and scavengers.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

100 Law and Policy

100. Legislation

100.1.3 Sub-national Level

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.4 County and Local

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.3 Develop policies that will promote the long term protection of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.23 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.48 Propose new State law or regulation mandating that a State-level "development impact fee" be assessed on all new development approved by municipalities (via the Municipal Land Use Law processes), and dedicate such monies to the development and implementation of regional Habitat Conservation Plans (or existing plans/programs serving the same regional function).

100.3.0.49 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address the issue of disturbance to habitat or species as a result of human activities (e.g., construction, bridge maintenance, road work, etc.).

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Pied-billed Grebe

Focal species that comprise this Conservation Target:

Pied-billed Grebe

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 1.1.1.2 Loss, alteration and/or degradation of habitat.

1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.1.2 Residential development using materials that cause collision hazards (Avg. Score: 1.00)

NJ Specific Threats: 1.1.2.1 Collision risk to volant species (birds, bats and invertebrates).

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 1.2.1.2 Loss, alteration and/or degradation of habitat.

1.2.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.

1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.2.2 Commercial development using materials that cause collision hazards (Avg. Score: 2.00)

NJ Specific Threats: 1.2.2.1 Collision risk to volant species (birds, bats and invertebrates).

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

3 Energy Production and Mining

3.1 Oil and Gas Facilities and Pipelines

3.1.1 Distribution processes of petroleum and other liquid hydrocarbons (Avg. Score: 1.00)

NJ Specific Threats: 3.1.1.1 Fragments terrestrial and aquatic habitats.

3.1.1.2 Loss, alteration and/or degradation of habitat.

3.1.1.3 Increased risk of oil spills.

3.1.1.4 Increased noise pollution.

3.1.1.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.

3.1.2 Natural gas distribution processes (Avg. Score: 1.00)

NJ Specific Threats: 3.1.2.2 Loss, alteration and/or degradation of habitat.

3.1.2.3 Increased risk of gas leaks and explosions.

3.1.2.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.

3.2 Mining and Quarrying

3.2.2 Surface Mining - Rock Quarry (and sand quarries) (Avg. Score: 1.00)

NJ Specific Threats: 3.2.2.1 Fragments terrestrial and aquatic habitats.

3.2.2.2 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

3.3 Renewable Energy

3.3.1 Wind Power (Avg. Score: 1.00)

NJ Specific Threats: 3.3.1.1 Turbines, blades, and structure foundations create a collision risk to volant species (birds, bats and invertebrates) and marine animals.

3.3.1.2 Fragments terrestrial habitats.

3.3.1.3 Loss, alteration and/or degradation of habitat.

3.3.1.4 Increased commercial infrastructure.

3.3.2 Solar Power (Avg. Score: 1.00)

NJ Specific Threats: 3.3.2.1 Fragments terrestrial habitats.

3.3.2.2 Loss, alteration and/or degradation of habitat.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.1.2 Movement of cars and other vehicles on roads and railroads (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 4.1.2.1 Increased vehicle traffic increases the risk of wildlife mortality from strikes.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads (Avg. Score: 1.00)

NJ Specific Threats: 4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

4.2.1.5 Tall radio and utility towers with guy lines pose a strike hazard for migrant bats and birds, especially in poor visibility conditions (e.g., fog, nighttime, poor weather conditions).

4.3 Shipping Lanes

4.3.2 Dredging impacts (Avg. Score: 2.00)

NJ Specific Threats: 4.3.2.2 Historic and current reuse of containment facilities over time may disrupt/displace nesting birds.

4.3.2.3 Transportation of materials to and from disposal facilities may pose temporary disturbance to wildlife impacting foraging and nesting success.

4.4 Flight Paths

4.4.1 Airplane flight paths (Avg. Score: 1.00)

NJ Specific Threats: 4.4.1.1 Increased noise disturbance to wildlife, disrupting their normal behaviors.

4.4.1.2 Increased risk of collision between airplanes and birds, bats and insects.

5 Biological Resource Use

5.4 Fishing and Harvesting of Aquatic Resources

5.4.2 Intentional Use (large scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.4.2.1 Overharvesting of one species may lead to detrimental impacts on another; e.g., overharvest of menhaden affecting piscivorous birds.

5.4.3 Unintentional effects (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.4.3.1 Abandoned fishing tackle and gear, crab pots without excluders and ghost crab pots increase the risk of injury and death to marine mammals, sea turtles, sea birds, pinnipeds and fish species as well as terrestrial and semi-aquatic species as a result of consuming tackle or gear, entrapment and entanglement in gear.

5.4.3.3 Heavy fishing pressure in localized areas can prevent foraging birds from hunting prime areas decreasing their likelihood of success and reproduction.

5.4.4 Unintentional effects (large scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.4.4.1 Fish introduced for sport fishing can negatively impact native species by competing for resources and/or altering the habitat (e.g., disrupting benthic communities and/or severely impacting aquatic vegetation).

5.4.4.3 Heavy fishing pressure in localized areas can prevent foraging birds from hunting prime areas decreasing their likelihood of success and reproduction.

5.4.4.6 Overexploitation of riparian, estuarine, and marine fisheries may deplete food resources required by marine mammals, sea turtles, marine fish and piscivorous birds, in turn resulting lower reproduction and survival.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized) (Avg. Score: 2.00)

NJ Specific Threats: 6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.

6.1.1.3 Increased risk of harassment that results in a change in wildlife behavior and/or direct mortality from vehicle strikes.

6.1.1.4 Increased noise pollution.

6.1.1.6 Off-road vehicles can be a mechanism of transference of wildlife diseases and invasive plant species if gear and apparel are not properly sanitized between sites.

6.1.2 Boating (Avg. Score: 3.00)

NJ Specific Threats: 6.1.2.1 Alteration and/or degradation of aquatic habitat.

6.1.2.2 Increased disturbance to marine animals and ocean-, bay- and marsh-associated birds which can alter their behavior decreasing the likelihood of their success and/or reproduction.

6.1.5 Wildlife observation and photography (Avg. Score: 2.00)

NJ Specific Threats: 6.1.5.1 Improperly conducted recreational activities may disrupt normal wildlife behaviors which can result in reduced reproductive success or survival, abandonment of critical sites, etc.

6.1.7 Other (Avg. Score: 3.00)

NJ Specific Threats: 6.1.7.1 Use of recreational or commercial pyrotechnics may cause temporary disturbance to wildlife, in particular to nesting birds.

6.1.7.3 Drone use in areas with sensitive wildlife (e.g., nesting and foraging birds, migrating and foraging/feeding whales) can alter their behavior and can cause disturbance that impacts their reproductive and/or foraging success.

6.2 Military Exercises

6.2.1 Military exercises (Avg. Score: 1.00)

NJ Specific Threats: 6.2.1.1 Military testing and training exercises may inflict disturbance and potential physical harm to wildlife.

6.3 Work and Other Activities

6.3.1 Unauthorized research projects at significant habitats (Avg. Score: 1.00)

NJ Specific Threats: 6.3.1.2 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.1.3 Activities conducted without proper precautions may disturb and disrupt normal wildlife behaviors, which may impact reproductive success or survival, cause abandonment of critical sites, etc.

6.3.2 Authorized research projects at significant habitats (Avg. Score: 1.00)

NJ Specific Threats: 6.3.2.3 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.2.4 Activities conducted without proper precautions may disturb and disrupt normal wildlife behaviors, which may impact reproductive success or survival, cause abandonment of critical sites, etc.

6.3.3 Other "work" unrelated to research (Avg. Score: 1.00)

NJ Specific Threats: 6.3.3.1 Construction projects may disrupt normal wildlife behavior which can result in reduced reproductive success or survival, abandonment of critical sites, etc. (e.g., bridge-nesting birds).

7 Natural Systems Modifications

7.2 Dams and Water Management/Use

7.2.1 Abstraction of Surface Water (domestic use) (Avg. Score: 1.00)

NJ Specific Threats: 7.2.1.1 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.1.2 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.2 Abstraction of Surface Water (commercial use) (Avg. Score: 2.00)

NJ Specific Threats: 7.2.2.2 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.2.3 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.3 Abstraction of Surface Water (agricultural use) (Avg. Score: 1.00)

NJ Specific Threats: 7.2.3.1 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.3.5 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.5 Abstraction of Ground Water (domestic use) (Avg. Score: 2.00)

NJ Specific Threats: 7.2.5.1 Heavy withdrawal of ground water for domestic use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.6 Abstraction of Ground Water (commercial use) (Avg. Score: 2.00)

NJ Specific Threats: 7.2.6.1 Heavy withdrawal of ground water for industrial and commercial use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.7 Abstraction of Ground Water (agricultural use) (Avg. Score: 2.00)

NJ Specific Threats: 7.2.7.1 Heavy withdrawal of ground water for agricultural use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.13 Stream Burial (Avg. Score: 1.00)

NJ Specific Threats: 7.2.13.1 Eliminates riparian habitats.

7.2.13.2 Eliminates in-stream habitat and water resources for wildlife.

7.2.14 Tidal Water Management (Avg. Score: 2.00)

NJ Specific Threats: 7.2.14.1 Freshwater tidal management for flood control alters water levels and salinity in tidal wetlands.

7.2.14.2 Tidal water management for the purpose of managing for select species may alter existing hydrologic or vegetative conditions to the detriment of other species.

7.2.14.3 Open marsh water management (and other techniques) to control mosquito populations may alter existing hydrologic or vegetative conditions to the detriment of other species.

7.2.14.4 Manipulation of marsh water levels may disturb nesting areas and flood nests.

7.3 Other Ecosystem Modifications

7.3.3 Removal of coarse woody debris (streams, forests, scrub-shrub habitats) (Avg. Score: 1.00)

NJ Specific Threats: 7.3.3.2 Decreases habitat and/or corridor suitability due to limited or absent shelter and foraging habitat.

7.3.4 Lack of natural disturbance patterns or ecosystem functions due to species loss (Avg. Score: 1.00)

NJ Specific Threats: 7.3.4.4 Human interference in natural processes such as clean up (e.g., beach-filling, shoreline hardening, tree/log removal from forests) after storms, in particular those causing post-hurricane washover and/or barrier island westward movement, and tree felling limits the disturbance needed to maintain appropriate habitats for wildlife.

7.3.5 Poor habitat management (Avg. Score: 1.00)

NJ Specific Threats: 7.3.5.2 Shifting from natural vegetation to lawns can cause increased temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

7.3.5.6 Habitat management, including that which occurs on public and private lands, that does not consider timing and species' behaviors can result in the direct mortality and/or alteration or loss of habitat.

7.3.5.10 Ditching, draining and filling of marshes and wetlands eliminates habitat and degrades the remaining surrounding areas for wildlife.

7.3.5.13 Private landowners with rare species on their properties are not always cooperative in the protection and management of the species' habitats. Landowners may be held accountable for their actions when they cause harm to the species or destroy the habitat, but it is often too late for the species' population.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.

8.1.1.4 Invasive, non-native animals increase the risk of predation on native animals and/or herbivory on native vegetation.

8.1.3 Invasive non-native aquatic plants (Avg. Score: 1.00)

NJ Specific Threats: 8.1.3.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.4 Invasive non-native terrestrial/wetland animals (Avg. Score: 1.00)

NJ Specific Threats: 8.1.4.2 Free-roaming and feral domestic animals such as cats and dogs causes direct mortality of wildlife and disturbance to wildlife breeding and resting areas.

8.1.5 Invasive non-native terrestrial/wetland plants (Avg. Score: 1.00)

NJ Specific Threats: 8.1.5.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.2 Problematic Native Species/Diseases

8.2.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.2.1.4 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.2.2 Named Species (Avg. Score: 1.00)

NJ Specific Threats: 8.2.2.2 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.5 Viral/Prion-induced Diseases

8.5.2 Named Species (Disease) (Avg. Score: 1.00)

NJ Specific Threats: 8.5.2.1 Diseases such as West Nile Virus, arenavirus, sudden oak death, Avian Influenza, and snake fungal disease cause morbidity or mortality to native populations.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.1 Domestic and Urban Waste Water

9.1.1 Sewage (Avg. Score: 1.00)

NJ Specific Threats: 9.1.1.1 Degradation of aquatic and marine water quality and habitats by changing turbidity, flow and water chemistry.

9.1.1.2 Leads to increased eutrophication and algae blooms that result in oxygen depletion.

9.1.2 Run-off (Avg. Score: 1.00)

NJ Specific Threats: 9.1.2.1 Chemical fertilizers and nutrient run-off changes the pH in streams and ponds and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.1.2.2 Contaminants degrade aquatic and marine water quality and can bioaccumulate in benthic organisms, threatening wildlife by causing developmental and behavioral abnormalities and reproductive failure.

9.1.2.3 Contaminants from road runoff (oil, sediment, salt, etc.) impact native vegetation and the species that rely upon them, degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2 Industrial and Military Effluents

9.2.1 Oil Spills (Avg. Score: 1.00)

NJ Specific Threats:

9.2.1.1 Oil spills render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.1.2 Oil spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.1.3 Oil spills cause external oiling of wildlife and ingestion of oil, both of which can injure or kill wildlife.

9.2.3 Other (Avg. Score: 1.00)

NJ Specific Threats:

9.2.3.1 Point and nonpoint source pollution such as polychlorinated biphenyls (PCBs), pesticides, heavy metals, and endocrine disrupting compounds (EDC's) into freshwater and marine systems pose threats to wildlife through direct contact and/or ingestion, and to aquatic species and their predators through bioaccumulation, impacting the reproductive success and neurological function of many avian and fish species.

9.2.3.2 Chemical spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.3.3 Chemical spills may render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.4 Other: Hydrofracturing (Avg. Score: 1.00)

NJ Specific Threats:

9.2.4.1 Contaminants from hydrofracturing degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2.4.2 Uncontrolled effluents escaping from hydrofracturing facilities can cause injury to wildlife and alter normal behaviors.

9.3 Agricultural and Forestry Effluents

9.3.1 Nutrient Loads (Avg. Score: 1.00)

NJ Specific Threats:

9.3.1.1 Chemical fertilizers and nutrient run-off changes the pH in streams, ponds and wetlands and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.3.1.2 Animal waste degrades terrestrial and aquatic habitats, especially streams, ponds and wetlands, resulting in eutrophication, which disrupts oxygen and nutrient balances, and causes injury and mortality to aquatic organisms.

9.3.3 Herbicides and Pesticides (Avg. Score: 1.00)

NJ Specific Threats:

9.3.3.1 Pesticides degrade terrestrial and aquatic habitats, especially streams, ponds and wetlands. Aquatic wildlife are particularly sensitive to these contaminants, which can cause developmental and behavioral abnormalities and reproductive failure. Some contaminants may bioaccumulate in predatory fish and birds and disrupt reproduction.

9.3.3.3 Use of pesticides can directly harm non-target species through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture (Avg. Score: 1.00)

NJ Specific Threats: 9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.4 Garbage and Solid Waste

9.4.1 Direct hazards to wildlife (Avg. Score: 2.00)

NJ Specific Threats: 9.4.1.1 Wildlife may ingest garbage causing choking or impingement in the digestive system, or they may become physically entangled in it (e.g., plastic or abandoned fish nets); conditions that make them unable to feed or drink, cause them to suffocate or drown, or otherwise restrict the animal's movement making them more susceptible to predators, starvation or injury.

9.5 Air-Bourne Pollutants

9.5.1 Acid Rain (Avg. Score: 1.00)

NJ Specific Threats: 9.5.1.1 Causes acidification of water bodies, resulting in changes to aquatic and marine communities and reducing biodiversity, and creating conditions that are unsuitable for some aquatic (freshwater and marine) and semi-aquatic species that are sensitive to pH shifts.

9.5.6 Herbicides and Pesticides (Avg. Score: 1.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

9.6 Excess Energy

9.6.1 Light Pollution (Avg. Score: 1.00)

NJ Specific Threats: 9.6.1.1 Artificial lighting can reduce suitability of adjacent habitat for species sensitive to artificial lights by disorienting wildlife, reducing foraging suitability or success, or increasing visibility to predators, resulting in reduced diversity and/or productivity of species in adjacent habitat.

9.6.3 Noise Pollution (Avg. Score: 2.00)

NJ Specific Threats: 9.6.3.1 Acute and chronic noise pollution in and adjacent to terrestrial and aquatic (marine and freshwater) environments could disrupt normal behaviors of wildlife such as migration, communication, feeding, eluding predators, resting and breeding, etc.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 1.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.2 Droughts

11.2.1 Droughts (Avg. Score: 2.00)

NJ Specific Threats: 11.2.1.1 Contribute to hardened soils, decreasing water recharge during rains and increasing the likelihood of flash floods during storms.

11.2.1.2 Lead to lower groundwater levels and therefore, less available water for people and habitats.

11.2.1.3 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

11.3 Temperature Extremes

11.3.1 Temperature extremes (Avg. Score: 1.00)

NJ Specific Threats: 11.3.1.1 Increasing temperatures may cause habitat loss and degradation by desiccating and/or raising the temperatures of small wetlands and streams leading to the loss of freshwater mussels and other aquatic species and species reliant upon these habitats.

11.3.1.2 Increased temperatures can negatively impact wetland, riverine, lacustrine and vernal pool-associated or -dependent wildlife by reducing flows, increasing water temperatures, lowering water levels and causing premature drying of vernal habitats.

11.3.1.3 Temperature extremes of surface water and air degrades marine habitats and ecosystems, threatening marine wildlife. Such extremes also disrupt offshore currents and migratory patterns, species' ranges, and/or impact communities/food chains, all of which further impact the ecosystem.

11.3.1.4 Extremely low temperatures and/or extensive periods of unseasonably low temperatures during critical life history stages (e.g., hibernation, gestation/nesting) can alter animals' behaviors and decrease survivorship.

11.4 Storms and Flooding

11.4.1 Storms and flooding (Avg. Score: 2.00)

NJ Specific Threats:

11.4.1.1 Extreme storms and flooding events threaten aquatic and marine wildlife through habitat degradation and alteration, including alterations to off-shore or back-bay benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic and marine wildlife.

11.4.1.2 Potentially damage coastal habitats, including beach- and marsh-nesting bird habitats and interdunal wetlands, and can increase marsh erosion.

11.4.1.3 Increase risk of saltwater intrusion to freshwater habitats altering the water chemistry and potentially altering aquatic wildlife community.

11.4.1.4 Flood events alter river or stream morphology, benthic conditions and habitat availability for wildlife, cause bank erosion, and deposit sediments in floodplain wetlands altering wildlife habitat.

11.4.1.6 Increased storms and flooding reduce nesting success, especially for ground-nesting birds.

11.4.2 Increased rainfall (Avg. Score: 1.00)

NJ Specific Threats:

11.4.2.1 Extreme rain events threaten aquatic wildlife through habitat degradation and alteration, including alterations to benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic wildlife.

11.4.2.2 Extreme rain events can damage wildlife nesting and resting habitats, including impacts to avian eggs and chick and small mammal survivorship.

11.4.2.3 More frequent rain events can alter terrestrial and wetland vegetation communities as well as wetland hydrology, shifting wildlife community use.

11.6 Phenology Shifting or Alteration

11.6.2 Phenology shifts related to predator-prey ecology (Avg. Score: 1.00)

NJ Specific Threats:

11.6.2.1 Alters inter-specific relationships (e.g., competition, parasitism, predation) of wildlife, ultimately leads to detrimental impacts on the ecological system.

11.6.2.2 Shifts timing of species migration, breeding and hibernation, and available food resources, causes redistribution of species, or mortality for species that are unable to relocate due to their already isolated habitat or limited mobility.

11.6.3 Phenology shifts related to species redistribution (Avg. Score: 1.00)

NJ Specific Threats:

11.6.3.1 Shifts in timing of species migration, breeding and hibernation, and available food resources, as a result of wildlife range shifts driven by climate change.

11.6.3.2 Shifts in nesting times or egg incubation durations can limit nest success and longterm populations.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 2.00)

NJ Specific Threats:

12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.2 Lack of up-to-date existing information (Avg. Score: 2.00)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.3 Need to answer research question (Avg. Score: 2.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.3.4 Lack of information regarding the potential short- and long-term impacts of wind turbines and other tall coastal structures on migratory populations.

12.1.4 Need to develop new technique (Avg. Score: 2.00)

NJ Specific Threats: 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.

12.1.4.2 Improve and evaluate survey methods for species not easily detected through standard survey methods.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 1.00)

NJ Specific Threats: 12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 1.00)

NJ Specific Threats: 12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 3.00)

NJ Specific Threats: 14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 3.00)

NJ Specific Threats: 14.2.1.5 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various wetland management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 2.00)

NJ Specific Threats: 15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.6 Secure and promote the protection/restoration of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.17 Develop a public-relations oriented certification program for private retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

2 Direct Management of Natural Resources

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.1 Control invasive insect infestations by implementing BMP strategies through biological, chemical and/or mechanical means that will depress, or when appropriate, eradicate populations in a manner that avoids excessive harm to non-target species using BMPs to control infestations and limit their spread based on an inventory of invasive insect distribution and response to outbreaks.

2.8.0.2 Develop, implement, monitor and evaluate pest control/management strategies to reduce the impacts of over-abundant wildlife species (native and/or native, invasive species) on native vegetation and the degradation of habitats supporting SGCN. Over-abundant wildlife species include but are not limited to mute swans, Canada geese, beaver and white-tailed deer.

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.5 Implement biologically safe and appropriate control/management strategies, and where appropriate, eradication strategies to reduce the impacts and/or limit the distribution of invasive and/or non-native plant species within or near aquatic systems using methods that will provide the most protection to the aquatic and riparian ecological system, and minimize disturbance to the soil and wildlife. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.8.0.6 Implement long-term management of invasive and/or non-native plants to help maintain functioning ecological systems and biological diversity, and to enhance travel corridors. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.10 Minimize the loss of important habitats (e.g., coastal scrub-shrub and grassy habitats, high and low marsh habitats, etc.) that provide nesting, migrating, and wintering areas for SGCN birds and other coastal and marsh-dependent species through habitat restoration efforts.

2.10.0.11 Restore and/or enhance critical migratory terrestrial and aquatic habitats (e.g., beach, grasslands, forest, scrub-shrub, etc.) for songbirds, raptors, shorebirds, waterfowl, bats and invertebrates through habitat restoration efforts and expand habitat restoration to adjacent private lands to increase the effective size of the habitat.

2.10.0.13 Restore and/or enhance impoundments to provide suitable foraging and nesting habitat for SGCN species inhabiting them (e.g., bitterns, rails, ducks, turtles and some invertebrates).

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.17 Maintain, enhance and/or restore SGCN-inhabited/used freshwater wetlands through restoring submerged aquatic vegetation.

2.10.0.26 Reestablish/restore historically important submerged aquatic vegetation beds in Delaware Bay tributaries to benefit SGCN waterfowl, waterbirds, terrapins, sea turtles and finfish.

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.6 Reclaim degraded rare species habitats by conducting vegetation management needed to restore habitat value for the documented/target SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.8 Maintain, enhance and/or restore biologically appropriate buffers for SGCN-inhabited/used freshwater wetlands through vegetation management.

2.11.0.13 Implement best management practices (BMPs), protective strategies, and guidelines for vegetation management to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.11.0.16 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.11.0.22 Minimize habitat loss of high and low marsh habitats that provide nesting, migrating and wintering areas for SGCN birds and other marsh-dependent SGCN by maintaining or enhancing these areas through habitat management and/or revegetation or restoration efforts.

2.11.0.30 Identify and prioritize areas where various management tools (such as increasing salinity through the management of water levels or chemical applications) may be effective in reducing phragmites within and restoring marsh habitat.

2.11.0.35 Increase structural habitat diversity by managing vegetation adjacent to aquatic habitats in a manner that provides a buffer from runoff and erosion and a microclimate to stabilize seasonal temperatures to benefit a variety of aquatic and semi-aquatic species.

2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.

2.11.0.41 Increase structural habitat diversity through the implementation of a variety of vegetation management practices such a prescribed burns (either increasing or decreasing their frequency depending on the site and objective), plantings, etc. that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.44 Manage phragmites adjacent to coastal marshes of interest, in particular those that are within underdeveloped areas and are unprotected, through herbicide application and water management to improve resiliency of the marshes to sea level rise.

2.12 Water management

2.12.3 Drainage

2.12.3.2 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) such as removing drainage ditches to restore natural stream flows and wetlands, that benefit wildlife inhabiting these areas.

2.12.3.3 Remove tile drains and drainage ditches to improve wetland hydrology and restore natural stream flows during appropriate times to avoid sensitive periods (e.g., nesting, denning, roosting) and minimizes harm to wildlife, particularly SGCN.

2.12.3.4 Expand the acreages and enhance the effective size of SGCN habitats by reclaiming/restoring adjacent, degraded habitats by removing tile drains and drainage ditches.

2.12.3.6 Protect significant natural and/or unique communities by and when removing tile drains and drainage ditches.

2.12.3.11 Implement best management practices (BMPs), protective strategies, and guidelines when removing tile drains and drainage ditches to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.12.6 Tide gate

2.12.6.1 Prevent or ameliorate near-term impacts of climate change throughout the State but in particular within the coastal and Delaware Bay areas by implementing habitat management strategies that will establish/improve habitat resilience, such as tide gates, that benefits wildlife inhabiting these areas.

2.12.7 Waterfowl impoundment maintenance

2.12.7.1 Manage impoundments to benefit SGCN species inhabiting them (e.g., bitterns, rails, ducks, turtles and some invertebrates).

2.12.7.2 Use impoundment management to create feeding and roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

2.12.7.3 Implement best management practices (BMPs), protective strategies, and guidelines for impoundment management to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.12.7.4 Implement impoundment management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimizes harm to wildlife, particularly SGCN.

2.12.7.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through impoundment management.

2.12.7.6 Reclaim degraded rare species habitats through impoundment management needed to restore habitat value for the documented/target SGCN.

2.12.7.7 Protect significant natural and/or unique communities by implementing best management practices for impoundment management.

2.12.7.9 Minimize habitat loss of critical coastal habitats in Delaware Bay that provide nesting, migrating, and wintering areas for birds and other coastal species by maintaining or enhancing these areas through impoundment management.

2.12.7.14 Prevent or ameliorate near-term impacts of climate change throughout the State but in particular within the coastal and Delaware Bay areas by implementing habitat management strategies that will establish/improve habitat resilience, such as impoundment management, that benefits wildlife inhabiting these areas.

2.12.8 Watering facilities

2.12.8.1 Install water control structures to reduce the impact of excessive salt water flooding to particularly vulnerable high marsh habitats.

2.12.8.2 Manage water levels in impoundments to improve coastal marsh habitat availability to wildlife and improve resiliency of the marshes to sea level rise.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.6 Conduct long-term studies on resident and migratory SGCN to determine if there are changes to the populations' demography (productivity, survival, dispersal) and/or to their critical and/or supporting habitats (i.e., diminishing in value, acreage or connectivity, etc.), in particular changes that would not maintain SGCN at viable levels for species populations. Update data and GIS maps; provide updated information to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.12 Compile available life history information on urban-associated SGCN (e.g., predators, levels of nest/young depredation, breeding longevity and reproductive effort over time, preferred nesting/reproductive requirements, fidelity to breeding and wintering sites, comprehensive assessment of migration routes and destinations) for future development of management strategies to benefit such species.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.25 Identify pathways of migratory SGCN in the Atlantic Coastal and Marine Regions (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and use the data to help evaluate the potential short- and long-term impacts of wind turbines, radio towers, utility guy lines, and other tall coastal structures on migratory populations.

3.0.0.26 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species including objectives and guidance pertaining to and the condition/status of critical and supporting habitats.

3.0.0.27 Evaluate the effectiveness of strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals through research and monitoring. Develop and provide NJ DEP and other appropriate governing agencies/commissions a summary of findings and recommendations to improve such efforts.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.2 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.0.4 Conduct long-term monitoring of the impacts of contaminants to vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.2 Age, size and sex structure

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.14 Compile information (obtained through literature reviews, communication with other States along the Atlantic coast, academia, etc.) regarding the impacts of above water operation of wind turbines on migratory marine birds and bats. Provide data to appropriate governing agencies and/or State commissions for integration into permitting review processes.

3.3.1.16 Gather "best information" for spatial modeling and update/create a current model/depiction of anticipated habitat shifts from sea-level rise, flooding, etc.

3.3.1.23 Identify areas (through surveys/studies, predictive modeling, review of available data, enlistment of habitat management and/or species experts, etc.) where the State can allow coastal marsh migration due to sea level rise, and target these areas for land acquisition and/or land management to accommodate this transition. Targeted areas should include underdeveloped areas adjacent to unprotected coastal marshes.

3.3.2 Monitoring

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.5 Conduct long-term monitoring of water quality of SGCN aquatic habitats (and aquatic systems feeding into those habitats) to evaluate protection and management efforts to reduce, if not eliminate, chemical contamination, siltation, eutrophication, and other forms of pollution/contamination of aquatic systems.

3.3.2.14 Research and evaluate the effectiveness of water quality management practices on water-dependent and semi-dependent SGCN, particularly those practices associated with permitting or mitigation actions.

3.3.2.15 Investigate the effectiveness of management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.3.2.20 Once a system is developed for reporting and qualifying new locations of invasive species, develop, implement and monitor/evaluate invasive species removal strategies at identified locations. Priority should be given to those areas critical to SGCN and/or contain unique and/or rare plant communities supporting SGCN and/or other fish/wildlife species.

3.3.2.21 Develop, implement and evaluate the effectiveness of management strategies use to restore marsh habitat (e.g., phragmites reduction).

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.8 Develop best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5.3.14 Develop aquaculture practices in the coastal areas that are compatible with the recovery of SGCN.

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.3.16 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.3.18 Develop recommendations to improve methods on land use practices such as ditching, impounding, dredging, open marsh water management, burning, and marsh restoration based on potential impacts on marsh-dependent SGCN.

3.5.3.23 Revise water quality management practices based on research on water-dependent and semi-dependent SGCN, particularly when associated with permitting or mitigation actions.

3.5.3.24 Based on research, modify management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.3.27 Conduct an assessment and develop a location list of available equipment for boom deployment during oil spills.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.13 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.4.14 Develop and implement agreements, and update existing agreements, with government agencies regarding the protection of critical SGCN habitats (e.g., significant breeding populations of beach nesting birds, colonial waterbird nesting areas, bat colonies, etc.).

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.17 Investigate new, non-invasive techniques for SGCN population evaluation through literature review, expert opinion, trial studies (if low risk), etc.

3.5.4.18 Investigate the effectiveness of survey techniques through selected "ground truthing" and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

3.5.4.22 Investigate the efficacy of implementing strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.1 Enhance and increase the effective size of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates by securing adjacent habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.3 Secure and protect riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.5 Secure and protect critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.1 Land acquisition

6.1.1 Fee title

6.1.1.1 Use state, federal, and local land acquisition programs (e.g., Green Acres, Blue Acres, etc.) to acquire abandoned or failing bay shore communities and to relocate displaced people and infrastructure.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.3 Increase the protection of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through conservation area designations.

6.3.0.9 Promote the protection of critical marine habitats for SGCN through conservation area designations.

7 Law Enforcement

7.1 Law enforcement

7.1.4 Scale Unspecified

7.1.4.7 Increase law enforcement presence to enforce regulations governing recreational activities (e.g., the use of personal watercraft and off road vehicles, caving, rock climbing, etc.) on conserved lands and within other sensitive habitats, and discourage activities that cause harm or disturbance to vegetation, wetlands, fish and wildlife.

7.1.4.16 Implement policies that protect and restore riparian areas.

7.1.4.17 Improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

7.1.4.22 Implement policies and/or regulations that prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.2 Develop a team of personnel from government entities, conservation organizations and other stakeholders engaged in oil/gas spill response for marine and freshwater habitats to develop a feasible plan for oil spill response and/or to amend NJ's current oil spill response plan that clearly outlines each organizations responsibilities and an assessment and location list of available equipment for boom deployment during oil spills.

8.1.0.4 Engage government agencies, conservation partners and other stakeholders in constructive dialogues encouraging them to influence policy change and the creation of incentives through a habitat bill and/or municipal ordinances for backyard habitat.

8.1.0.6 Engage government agencies, conservation partners and other stakeholders in discussions focused on sharing information regarding coastal and marine critical wildlife habitats, developing comprehensive mapping to assist in reducing impacts of energy production activities, and establishing a long-term monitoring program to update the data. Ensure this information is available to appropriate personnel for planning or response measures.

8.1.0.11 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting sportsmen's organizations and fisheries, as well as public constituents, addressing the unintended effects abandoned fishing gear, tackle and crab pots can have on wildlife, and promote the collection and/or reporting of abandoned items and their locations.

8.1.0.12 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting sportsmen's organizations and fisheries, as well as public constituents, addressing the unintended effects fishing gear and tackle can have on wildlife.

8.1.0.13 Engage DOD in a constructive dialogue regarding strategies to minimize disturbances to all SGCN (i.e., beyond their federal requirements) from forest management and other practices on their lands.

8.1.0.14 Engage DOD in a constructive dialogue regarding strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.33 Engage government agencies, conservation partners and other land managers, communities, landowners, and commercial and industrial stakeholders in discussions regarding the importance of protecting and methods to protect priority wetlands beyond the levels afforded through regulation by maintaining and/or restoring optimal biological buffers around wetlands.

8.1.0.42 Engage citizens, wildlife observers and photographers through discussions and distributable information regarding the importance of and encouraging implementing responsible and ethical behavior when observing wildlife by developing an alliance of wildlife photographers and widely circulating recommendations on how to reduce impact.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.2 Utilize WSFR grant funds, in combination with alternate funding sources as needed, to implement an extensive educational/outreach program consisting of displays, fliers, list-serve mailings, Facebook posts and speaking engagements with sportsmen's organizations and fisheries, as well as public constituents, addressing the unintended effects fishing gear and tackle can have on non-target species.

8.3.0.4 Utilize WSFR grant funds, in combination with alternate funding sources as needed, to implement an extensive educational/outreach program consisting of displays, fliers, list-serve mailings, Facebook posts and speaking engagements with sportsmen's organizations and fisheries addressing the unintended effects abandoned fishing gear, tackle and crab pots can have on wildlife.

8.3.0.6 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners, land managers and local communities to discourage the presence of managed cat colonies and trap, neuter and release programs in wildlife habitats.

8.3.0.7 Develop and provide (or otherwise make publicly available) educational programs and/or materials that describe the negative impacts of off-road vehicles and watercraft use in and adjacent to critical SGCN habitats, and the importance of confining such activities to more appropriate locations and/or seasons.

8.3.0.8 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate recreationists and encourage landowners to eliminate garbage in the vicinity of suitable wildlife habitat, in particular SGCN habitat. Information should include the detrimental impacts garbage may have on various wildlife species.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.14 Develop an educational outreach program using a variety of media to ensure maximizing the distribution of information, in particular targeting sportsmen's organizations and fisheries, regarding the unintended effects abandoned fishing gear, tackle and crab pots can have on wildlife, including non-target species.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.8 Develop a plan that focuses on strategies for oil pipelines to avoid sensitive habitats that would be highly impacted by oil spills.

9.1.0.12 Develop a plan to avoid freshwater tidal management.

9.1.0.18 Develop a plan to minimize the effects of road widening and traffic volume increases within critical wildlife habitat areas using CHANJ products.

9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.31 Develop wetland restoration plans that consider the life history and needs of wildlife occupying targeted habitats.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.2 Organizational strategic and CMS planning

9.2.1 Organizational strategic and operational planning

9.2.1.1 Identify and codify legal ORV access areas on state lands.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.6 Amend NJ's current oil spill response plan to 1) expand the geographic area addressed, 2) expand the targeted species impacted and in need of recovery, and 3) revise current and integrate new actions into the plan as needed.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.16 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.1.20 Use compiled life history information on urban-associated SGCN regarding threats, breeding, fecundity, survival, habitat needs, wintering sites/roosts, migration routes and destinations, etc. to develop wildlife management strategies to benefit such species.

9.3.2 Listed species recovery planning

9.3.2.1 Develop proactive species recovery plans for all endangered and threatened species including guidance and objectives pertaining to critical and supporting habitat to meet and maintain recovery goals.

9.3.3 Habitat management planning

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.16 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.24 Develop a plan to improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

9.3.3.25 Develop a habitat management plan focused on areas important to near-shore, coastal species (e.g., herring, sturgeon, terrapin, nesting birds) that prioritizes these areas to direct resources to minimize the impacts of sea-level rise, flooding and storms (including extreme rain events) such as increased erosion of beach, mudflat and marsh habitats, and the increased risk of saltwater intrusion into freshwater habitats. Gather "best information" for spatial modeling of anticipated habitat shifts from sea-level rise, flooding, etc.

9.3.3.29 Develop habitat management plans aimed at reducing or eliminating negative impacts of ORVs.

9.3.3.32 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3.38 Use compiled life history information on urban-associated SGCN regarding threats, breeding, fecundity, survival, habitat needs, wintering sites/roosts, migration routes and destinations, etc. to develop habitat management strategies to benefit such species.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.3 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.6 Review all projects to be conducted in or adjacent to coastal wetlands and marshes, and provide recommendations on how to best avoid or reduce human disturbance at nesting areas (for example, timing restrictions) and actions not permitted.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.9 Review strategies for creating or enhancing connectivity (e.g., installing appropriately-sized wildlife passages) between wetlands to allow wildlife to disperse naturally and safely.

11.1.1.10 Use CHANJ mapping in reviews of proposed energy, mining, transportation and utility service companies/agencies' projects to attempt to maintain habitat connectivity and reduce fragmentation, and identify potential impacts of the projects.

11.1.1.13 Use the best available science (species data, habitat present, wind farm layout options, wind blade impacts on migratory species, location of migration routes, etc.) when conducting regulatory reviews of proposed wind farm projects to minimize impacts on migratory and resident wildlife and reduce habitat fragmentation.

11.1.2 Review of proposed policies and plans

11.1.2.2 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.14 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters), and to enhance or restore biologically appropriate buffers.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

100 Law and Policy

100. Legislation

100.1.3 Sub-national Level

100.1.3.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.3.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.4 County and Local

100.1.4.13 Encourage municipal laws regulating domestic pets that may predate on wildlife.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.5.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.1 Develop (and/or improve) policies and/or regulations that will promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

100.3.0.2 Improve policies/regulations aimed at protecting and preserving critical coastal and marsh habitats and securing mitigation for losses that create an environmental benefit.

100.3.0.3 Develop policies that will promote the long term protection of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates.

100.3.0.4 Promote policies and regulations that support marine conservation zone designations in suitable areas identified through research and literature.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.13 Develop policies that will promote protecting and restoring riparian areas.

100.3.0.14 Develop policies and/or regulations that increase the protective buffers of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) to biologically appropriate distances to benefit SGCN that rely upon these habitats and improve the function of the [associated] aquatic systems.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.20 Develop policies and/or regulations that prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

100.3.0.23 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.26 Adopt regulations requiring the combined sewer overflow alternative analyses required by regulation address potential impacts to wildlife in watercourses or receiving water bodies.

100.3.0.27 Amend harvest, license and/or permit requirements to incorporate guidance regarding the use of gear and/or tackle and current best practices to minimize bycatch or entanglement of non-target species.

100.3.0.38 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.3.0.39 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.3.0.42 Fully adopt the former Storm water Management Rules' 300ft buffer requirements into the Flood Hazard Area Control Act Rules.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.48 Propose new State law or regulation mandating that a State-level "development impact fee" be assessed on all new development approved by municipalities (via the Municipal Land Use Law processes), and dedicate such monies to the development and implementation of regional Habitat Conservation Plans (or existing plans/programs serving the same regional function).

100.3.0.49 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address the issue of disturbance to habitat or species as a result of human activities (e.g., construction, bridge maintenance, road work, etc.).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.64 Develop regulations that when implemented will protect and restore riparian areas.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.2 Create a policy that requires the NJ DEP to incorporate scientific information regarding climate change and sea level rise (e.g., predictions, habitat management/acquisition efforts to enhance resilience to inundation) on their websites and to work with other government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Red-headed Woodpecker

Focal species that comprise this Conservation Target:

Red-headed Woodpecker

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 1.1.1.2 Loss, alteration and/or degradation of habitat.

1.1.2 Residential development using materials that cause collision hazards (Avg. Score: 1.00)

NJ Specific Threats: 1.1.2.1 Collision risk to volant species (birds, bats and invertebrates).

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 1.2.1.2 Loss, alteration and/or degradation of habitat.

1.2.2 Commercial development using materials that cause collision hazards (Avg. Score: 1.00)

NJ Specific Threats: 1.2.2.1 Collision risk to volant species (birds, bats and invertebrates).

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 1.3.1.2 Loss, alteration and/or degradation of habitat.

2 Agriculture and Aquaculture

2.2 Wood and Pulp Plantations

2.2.1 Small Holder (Avg. Score: 1.00)

NJ Specific Threats: 2.2.1.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.2.1.2 Tree harvesting can cause direct mortality to wildlife, especially if done during peak activity periods or vulnerable life stages (e.g., denning, nesting, gestation/birthing, basking, roosting, pre-volancy, etc.).

2.2.2 Agro-industry Plantations (Avg. Score: 2.00)

NJ Specific Threats: 2.2.2.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.2.2.2 Tree harvesting can cause direct mortality to wildlife, especially if done during peak activity periods or vulnerable life stages (e.g., denning, nesting, gestation/birthing, basking, roosting, pre-volancy, etc.).

3 Energy Production and Mining

3.1 Oil and Gas Facilities and Pipelines

3.1.1 Distribution processes of petroleum and other liquid hydrocarbons (Avg. Score: 1.00)

NJ Specific Threats: 3.1.1.1 Fragments terrestrial and aquatic habitats.

3.1.1.2 Loss, alteration and/or degradation of habitat.

3.1.1.3 Increased risk of oil spills.

3.1.1.4 Increased noise pollution.

3.1.1.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.

3.1.2 Natural gas distribution processes (Avg. Score: 1.00)

NJ Specific Threats: 3.1.2.1 Fragments terrestrial and aquatic habitats.

3.1.2.2 Loss, alteration and/or degradation of habitat.

3.1.2.4 Increased noise pollution.

3.2 Mining and Quarrying

3.2.2 Surface Mining - Rock Quarry (and sand quarries) (Avg. Score: 1.00)

NJ Specific Threats: 3.2.2.1 Fragments terrestrial and aquatic habitats.

3.2.2.2 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

3.3 Renewable Energy

3.3.1 Wind Power (Avg. Score: 1.00)

NJ Specific Threats: 3.3.1.1 Turbines, blades, and structure foundations create a collision risk to volant species (birds, bats and invertebrates) and marine animals.

3.3.1.3 Loss, alteration and/or degradation of habitat.

3.3.2 Solar Power (Avg. Score: 1.00)

NJ Specific Threats: 3.3.2.1 Fragments terrestrial habitats.

3.3.2.2 Loss, alteration and/or degradation of habitat.

3.4 Conventional Power Plants

3.4.0 Conventional Power Plants (Avg. Score: 1.00)

NJ Specific Threats: 3.4.0.2 Loss, alteration and/or degradation of habitat due to new or the expansion of current facilities.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.1.2 Movement of cars and other vehicles on roads and railroads (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 4.1.2.1 Increased vehicle traffic increases the risk of wildlife mortality from strikes.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads (Avg. Score: 1.00)

NJ Specific Threats: 4.2.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species, inhibiting dispersal of non-volant animals, reducing gene flow, and creating barriers to fish when service line-associated roads cross streams (e.g., bridges, culverts, fords, etc.).

4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

4.2.1.5 Tall radio and utility towers with guy lines pose a strike hazard for migrant bats and birds, especially in poor visibility conditions (e.g., fog, nighttime, poor weather conditions).

4.2.2 Management of rights-of-way or communication tower facilities and/or their associated access roads (Avg. Score: 1.00)

NJ Specific Threats: 4.2.2.1 Improper or poorly scheduled vegetation management can cause direct mortality to and may reduce productivity of wildlife.

4.4 Flight Paths

4.4.1 Airplane flight paths (Avg. Score: 1.00)

NJ Specific Threats: 4.4.1.2 Increased risk of collision between airplanes and birds, bats and insects.

5 Biological Resource Use

5.2 Gathering Terrestrial Plants

5.2.3 Control (Avg. Score: 1.00)

NJ Specific Threats: 5.2.3.2 Clearing of scrub-shrub vegetation [and snags] diminishes cover and nesting habitat.

5.3 Logging and Wood Harvesting

5.3.1 Intentional Use (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.1.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.1.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.1.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.2 Intentional Use (large scale) (Avg. Score: 2.00)

NJ Specific Threats: 5.3.2.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.2.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.2.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.3 Unintentional effects (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.3.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4 Unintentional effects (large scale) (Avg. Score: 2.00)

NJ Specific Threats: 5.3.4.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4.5 Lack of appropriate, sustainable forest management can lead to a decrease in forest habitat diversity, degraded habitat for many forest species, the loss of habitat for early-successional species, and/or the loss of unique habitats for species that need canopy breaks and multi-aged tree composition to fulfill various life history requirements.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized) (Avg. Score: 1.00)

NJ Specific Threats: 6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.

6.1.1.4 Increased noise pollution.

6.1.1.6 Off-road vehicles can be a mechanism of transference of wildlife diseases and invasive plant species if gear and apparel are not properly sanitized between sites.

6.1.5 Wildlife observation and photography (Avg. Score: 1.00)

NJ Specific Threats: 6.1.5.1 Improperly conducted recreational activities may disrupt normal wildlife behaviors which can result in reduced reproductive success or survival, abandonment of critical sites, etc.

6.1.5.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.1.7 Other (Avg. Score: 1.00)

NJ Specific Threats: 6.1.7.1 Use of recreational or commercial pyrotechnics may cause temporary disturbance to wildlife, in particular to nesting birds.

6.1.7.3 Drone use in areas with sensitive wildlife (e.g., nesting and foraging birds, migrating and foraging/feeding whales) can alter their behavior and can cause disturbance that impacts their reproductive and/or foraging success.

6.2 Military Exercises

6.2.1 Military exercises (Avg. Score: 1.00)

NJ Specific Threats: 6.2.1.1 Military testing and training exercises may inflict disturbance and potential physical harm to wildlife.

6.3 Work and Other Activities

6.3.1 Unauthorized research projects at significant habitats (Avg. Score: 1.00)

NJ Specific Threats: 6.3.1.1 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.2 Authorized research projects at significant habitats (Avg. Score: 1.00)

NJ Specific Threats: 6.3.2.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

7 Natural Systems Modifications

7.1 Fire and Fire Suppression

7.1.1 Increase in Fire Frequency/Intensity (Avg. Score: 1.00)

NJ Specific Threats: 7.1.1.1 Increase in frequency and intensity of wild fires as a result of droughts and heat waves drying out vegetation and litter.

7.1.1.2 Increase in frequency of wild fires as a result of illegal activities.

7.1.1.3 Unnatural fire regimes occurring as a result of military exercises.

7.1.1.4 Lack of diversity in age structure and composition of vegetation due to expansive, frequent fires.

7.1.2 Suppression of Fire Frequency/Intensity (Avg. Score: 3.00)

NJ Specific Threats: 7.1.2.1 Shift in vegetative communities as a result of suppression of natural fires.

7.1.2.2 Lack of diversity in age structure and composition of vegetation due to the suppression of fire.

7.3 Other Ecosystem Modifications

7.3.3 Removal of coarse woody debris (streams, forests, scrub-shrub habitats) (Avg. Score: 3.00)

NJ Specific Threats: 7.3.3.2 Decreases habitat and/or corridor suitability due to limited or absent shelter and foraging habitat.

7.3.3.3 Removal of dead trees (snags), large felled logs (i.e., those > 12" dbh), and other downed woody material diminishes nesting, roosting, and sheltering options for wildlife, and increases the ease at which deer can browse regenerating vegetation.

7.3.4 Lack of natural disturbance patterns or ecosystem functions due to species loss (Avg. Score: 2.00)

NJ Specific Threats: 7.3.4.1 The management and/or loss of beavers decreases natural disturbance patterns.

7.3.4.5 The lack of forest disturbance minimizes the diversity of herbaceous vegetation and other shrubs and trees that need a lot of sunlight to grow.

7.3.5 Poor habitat management (Avg. Score: 3.00)

NJ Specific Threats: 7.3.5.1 Improper or poorly scheduled maintenance of man-made corridors (e.g., roadsides and medians) can cause direct mortality to and may reduce productivity of wildlife.

7.3.5.3 Vegetation clearing removes terrestrial and riparian corridors for animal movement, shelter, and resting areas.

7.3.5.5 Habitat management that alters or removes vegetation without implementing long-term management increases the risk of invasive and exotic plants establishing themselves, outcompeting native vegetation.

7.3.5.6 Habitat management, including that which occurs on public and private lands, that does not consider timing and species' behaviors can result in the direct mortality and/or alteration or loss of habitat.

7.3.5.12 Lack of diversity in age structure and composition of vegetation due to lack of natural disturbances and/or vegetation management.

7.3.5.14 Intentional felling and removal of dead standing trees or snags eliminates resting, nesting or feeding habitat, and precludes the snags eventual contribution to coarse woody debris and forest floor structure and habitat.

7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

7.3.5.17 Decreased diversity in height and species of herbaceous vegetation resulting in reduced cover and food for nesting and foraging wildlife.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.4 Invasive non-native terrestrial/wetland animals (Avg. Score: 1.00)

NJ Specific Threats: 8.1.4.1 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.4.2 Free-roaming and feral domestic animals such as cats and dogs causes direct mortality of wildlife and disturbance to wildlife breeding and resting areas.

8.2 Problematic Native Species/Diseases

8.2.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.2.1.2 Invasive pathogens and insects may increase in range and abundance as limiting factors (such as temperature) are altered as a result of climate change.

8.2.1.4 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.2.2 Named Species (Avg. Score: 1.00)

NJ Specific Threats: 8.2.2.2 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.5 Viral/Prion-induced Diseases

8.5.2 Named Species (Disease) (Avg. Score: 1.00)

NJ Specific Threats: 8.5.2.1 Diseases such as West Nile Virus, arenavirus, sudden oak death, Avian Influenza, and snake fungal disease cause morbidity or mortality to native populations.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.1 Domestic and Urban Waste Water

9.1.1 Sewage (Avg. Score: 1.00)

NJ Specific Threats: 9.1.1.3 Contaminants in sewage treatment effluents and Combined Sewer Overflows can cause developmental and behavioral abnormalities and reproductive failure in wildlife.

9.1.2 Run-off (Avg. Score: 1.00)

NJ Specific Threats: 9.1.2.3 Contaminants from road runoff (oil, sediment, salt, etc.) impact native vegetation and the species that rely upon them, degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2 Industrial and Military Effluents

9.2.1 Oil Spills (Avg. Score: 1.00)

NJ Specific Threats: 9.2.1.1 Oil spills render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.1.2 Oil spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.3 Other (Avg. Score: 1.00)

NJ Specific Threats: 9.2.3.1 Point and nonpoint source pollution such as polychlorinated biphenyls (PCBs), pesticides, heavy metals, and endocrine disrupting compounds (EDC's) into freshwater and marine systems pose threats to wildlife through direct contact and/or ingestion, and to aquatic species and their predators through bioaccumulation, impacting the reproductive success and neurological function of many avian and fish species.

9.2.3.2 Chemical spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.3.3 Chemical spills may render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.4 Other: Hydrofracturing (Avg. Score: 1.00)

NJ Specific Threats: 9.2.4.1 Contaminants from hydrofracturing degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2.4.2 Uncontrolled effluents escaping from hydrofracturing facilities can cause injury to wildlife and alter normal behaviors.

9.3 Agricultural and Forestry Effluents

9.3.3 Herbicides and Pesticides (Avg. Score: 1.00)

NJ Specific Threats: 9.3.3.3 Use of pesticides can directly harm non-target species through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture (Avg. Score: 1.00)

NJ Specific Threats: 9.3.5.1 Use of pesticides, insecticides, and/or herbicides can directly harm non-target species, such as amphibians and beneficial invertebrates through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5.3 Use of pesticides and herbicides can minimize the abundance of invertebrates needed as a food source for many birds.

9.3.5.4 Improper use of current insecticides, such as those containing esfenvalerate, prallethrin, or piperonyl butoxide, or past use of pesticides containing chlordane still present in the soils, are toxic to various wildlife species, and can cause injury, mortality, or other effects that impair population viability.

9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.5 Air-Bourne Pollutants

9.5.1 Acid Rain (Avg. Score: 2.00)

NJ Specific Threats: 9.5.1.1 Causes acidification of water bodies, resulting in changes to aquatic and marine communities and reducing biodiversity, and creating conditions that are unsuitable for some aquatic (freshwater and marine) and semi-aquatic species that are sensitive to pH shifts.

9.5.1.2 Leaches calcium from the soils which in turn reduces the availability of prey, particularly calcium-rich prey such as snails.

9.5.6 Herbicides and Pesticides (Avg. Score: 1.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

9.6 Excess Energy

9.6.1 Light Pollution (Avg. Score: 1.00)

NJ Specific Threats: 9.6.1.1 Artificial lighting can reduce suitability of adjacent habitat for species sensitive to artificial lights by disorienting wildlife, reducing foraging suitability or success, or increasing visibility to predators, resulting in reduced diversity and/or productivity of species in adjacent habitat.

9.6.3 Noise Pollution (Avg. Score: 1.00)

NJ Specific Threats: 9.6.3.1 Acute and chronic noise pollution in and adjacent to terrestrial and aquatic (marine and freshwater) environments could disrupt normal behaviors of wildlife such as migration, communication, feeding, eluding predators, resting and breeding, etc.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 1.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.2 Droughts

11.2.1 Droughts (Avg. Score: 1.00)

NJ Specific Threats: 11.2.1.3 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

11.3 Temperature Extremes

11.3.1 Temperature extremes (Avg. Score: 1.00)

NJ Specific Threats: 11.3.1.3 Temperature extremes of surface water and air degrades marine habitats and ecosystems, threatening marine wildlife. Such extremes also disrupt offshore currents and migratory patterns, species' ranges, and/or impact communities/food chains, all of which further impact the ecosystem.

11.4 Storms and Flooding

11.4.1 Storms and flooding (Avg. Score: 1.00)

NJ Specific Threats: 11.4.1.5 Storm damage can alter forest structure via blow-downs or micro-bursts, and can destroy bird nesting in the locales where the storms occur.

11.4.2 Increased rainfall (Avg. Score: 1.00)

NJ Specific Threats: 11.4.2.2 Extreme rain events can damage wildlife nesting and resting habitats, including impacts to avian eggs and chick and small mammal survivorship.

11.4.2.3 More frequent rain events can alter terrestrial and wetland vegetation communities as well as wetland hydrology, shifting wildlife community use.

11.6 Phenology Shifting or Alteration

11.6.2 Phenology shifts related to predator-prey ecology (Avg. Score: 1.00)

NJ Specific Threats: 11.6.2.1 Alters inter-specific relationships (e.g., competition, parasitism, predation) of wildlife, ultimately leads to detrimental impacts on the ecological system.

11.6.2.2 Shifts timing of species migration, breeding and hibernation, and available food resources, causes redistribution of species, or mortality for species that are unable to relocate due to their already isolated habitat or limited mobility.

11.6.3 Phenology shifts related to species redistribution (Avg. Score: 1.00)

NJ Specific Threats: 11.6.3.1 Shifts in timing of species migration, breeding and hibernation, and available food resources, as a result of wildlife range shifts driven by climate change.

11.6.3.2 Shifts in nesting times or egg incubation durations can limit nest success and longterm populations.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 1.00)

NJ Specific Threats: 12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.2 Lack of up-to-date existing information (Avg. Score: 1.00)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.3 Need to answer research question (Avg. Score: 2.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.3.4 Lack of information regarding the potential short- and long-term impacts of wind turbines and other tall coastal structures on migratory populations.

12.1.4 Need to develop new technique (Avg. Score: 1.00)

NJ Specific Threats: 12.1.4.2 Improve and evaluate survey methods for species not easily detected through standard survey methods.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 1.00)

NJ Specific Threats:

12.3.0.1 Regulatory habitat protections within state land use regulations are spatially limited to specific geographic areas (e.g., Pinelands, Coastal Area) or geographic features (e.g., wetlands, streams) and so fail to protect critical habitats that exist outside of these regulated areas.

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.9 Prescribed burns implemented by the NJ Forest Fire Service are constrained by State air quality regulations to a timeframe where seasonal weather conditions are less than ideal for effective burning. As a result, the Forest Fire Service is limited in the number of overall prescribed burns it can implement to restore habitat for wildlife.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 1.00)

NJ Specific Threats:

12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.

12.4.0.5 Bureau of Forest Fire Management policy has traditionally implemented prescribed burns on State lands for the sole purpose of public safety (i.e., addressing hazard fuel reduction), missing opportunities to burn in a manner that would additionally manage habitat for ecological diversity.

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 1.00)

NJ Specific Threats:

14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 2.00)

NJ Specific Threats:

14.2.1.1 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various forest management practices.

14.2.1.5 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various wetland management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 2.00)

NJ Specific Threats: 15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.1 Enhance critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates through incentive programs with adjacent private landowners to increase the effective size of the habitat.

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.3 Secure and promote the protection/restoration of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through incentive programs.

1.2.1.6 Secure and promote the protection/restoration of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.9 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing Forestry Stewardship Programs.

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.12 Create incentives (non-monetary and/or monetary) for land developers to redevelop abandoned areas (e.g., shopping centers, office complexes) to minimize the loss of natural habitats and reduce the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.14 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of herbicides and pesticides, and implementing more ecologically safe strategies when using such products.

1.2.1.16 Create incentives (non-monetary and/or monetary) within State regulations (mitigations requirements or credit, BMP satisfaction, etc.) to promote the use of retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.17 Develop a public-relations oriented certification program for private retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.18 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and land managers to control and reduce the impacts of invasive, native and non-native species in order to increase structural habitat diversity.

1.2.1.19 Create incentives for federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to farmers, woodland landowners, and private landowners to adopt and/or endorse consistent BMPs concerning controlled burns to maintain and/or improve wildlife habitat.

1.2.1.20 Coordinate across government agencies and non-government organizations to create or expand upon tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMP's.

1.2.1.21 Create and/or support market-based programs that subsidize or create branding for products derived sustainably from managed wildlife habitats.

1.2.1.22 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to horse/livestock farm owners and managers to increase structural habitat diversity in and around the farms by managing vegetation for a variety of species, in particular, farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

1.2.1.23 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to provide cost shares and/or plan approvals for management based on management approaches and prescriptions.

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

1.2.1.28 Create incentives to implement dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

2 Direct Management of Natural Resources

2.3 Fire management

2.3.3 Prescribed burning

2.3.3.1 Evaluate different management techniques of prescribed burns that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

2.3.3.2 Conduct prescribed burning in Northern New Jersey forests to maintain and regenerate a mosaic of upland forest habitats.

2.3.3.3 Conduct prescribed burning to improve wildlife habitat.

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.1 Control invasive insect infestations by implementing BMP strategies through biological, chemical and/or mechanical means that will depress, or when appropriate, eradicate populations in a manner that avoids excessive harm to non-target species using BMPs to control infestations and limit their spread based on an inventory of invasive insect distribution and response to outbreaks.

2.8.0.2 Develop, implement, monitor and evaluate pest control/management strategies to reduce the impacts of over-abundant wildlife species (native and/or native, invasive species) on native vegetation and the degradation of habitats supporting SGCN. Over-abundant wildlife species include but are not limited to mute swans, Canada geese, beaver and white-tailed deer.

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.6 Implement long-term management of invasive and/or non-native plants to help maintain functioning ecological systems and biological diversity, and to enhance travel corridors. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.8 Protect significant natural and/or unique communities by implementing best management practices when conducting habitat restoration strategies.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.10 Minimize the loss of important habitats (e.g., coastal scrub-shrub and grassy habitats, high and low marsh habitats, etc.) that provide nesting, migrating, and wintering areas for SGCN birds and other coastal and marsh-dependent species through habitat restoration efforts.

2.10.0.11 Restore and/or enhance critical migratory terrestrial and aquatic habitats (e.g., beach, grasslands, forest, scrub-shrub, etc.) for songbirds, raptors, shorebirds, waterfowl, bats and invertebrates through habitat restoration efforts and expand habitat restoration to adjacent private lands to increase the effective size of the habitat.

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.21 Restore and/or enhance understory habitats that suppress invasive species and provide critical resources and enhance sheltering, foraging, and nesting cover for wildlife.

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.10.0.23 Restore and/or enhance roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.11.0.3 Create suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats through vegetation management.

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through vegetation management.

2.11.0.6 Reclaim degraded rare species habitats by conducting vegetation management needed to restore habitat value for the documented/target SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.8 Maintain, enhance and/or restore biologically appropriate buffers for SGCN-inhabited/used freshwater wetlands through vegetation management.

2.11.0.9 Minimize habitat loss of critical coastal habitats that provide nesting, migrating, and wintering areas for birds and other coastal species by maintaining or enhancing these areas through vegetation management.

2.11.0.12 Conduct vegetation management to create feeding and roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

2.11.0.13 Implement best management practices (BMPs), protective strategies, and guidelines for vegetation management to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.11.0.16 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.11.0.20 Create and/or maintain scrub-shrub habitats through management efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.11.0.21 Minimize the degradation, alteration and/or changes in hydrology of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and subsequent disturbances to and behavioral changes of wildlife by maintaining or enhancing these areas and biologically appropriate buffers through habitat management and/or revegetation or restoration efforts.

2.11.0.23 Implement appropriate habitat management actions in areas where natural disturbances, such as wildfire, have been precluded.

2.11.0.31 In areas where vegetative communities are shifting due to fire suppression and controlled burns are not feasible, manage vegetation to improve wildlife habitat.

2.11.0.32 Increase structural habitat diversity around and when feasible, within agricultural landscapes by managing vegetation for a variety of species, in particular, those farms that have removed scrub-shrub habitat and/or fragmented forests, and by implementing ecologically best practices (e.g., no-till farming, maintaining hedgerows, buffer set-asides, etc.).

2.11.0.33 Increase structural habitat diversity by implementing long-term vegetation management to minimize the potential for the establishment of invasive and/or non-native plants that may outcompete native vegetation.

2.11.0.34 Increase structural habitat diversity by managing residential, commercial and recreational areas' landscapes for a variety of species. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.

2.11.0.37 Increase structural habitat diversity by minimizing the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats which benefits wildlife.

2.11.0.38 Increase structural habitat diversity in and around horse/livestock farms by managing vegetation for a variety of species, in particular, in and around farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

2.11.0.39 Increase structural habitat diversity in and around solar farms by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.40 Increase structural habitat diversity surrounding areas used for energy, mining, and transportation and service corridors by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides, and avoid managing habitat during the breeding seasons for ground-nesting birds, reptiles, amphibians and small mammals.

2.11.0.41 Increase structural habitat diversity through the implementation of a variety of vegetation management practices such a prescribed burns (either increasing or decreasing their frequency depending on the site and objective), plantings, etc. that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.42 Increase structural habitat diversity within wind farms for terrestrial bound and low-flying species and around wind farms for other wildlife by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.43 Manage forests to increase variation in age structure and composition using BMPs that promote and maintain functioning ecological forest-based systems and biological diversity.

2.13 Wildlife damage management

2.13.0 Nuisance fish and wildlife damage

2.13.0.5 Investigate the impacts of human-subsidized and/or naturally occurring predator species on SGCN to assess the need for integrated wildlife damage management techniques (e.g., predator exclosures, fish blockages, electric fence, culls) and/or policy changes on state land management that minimize the impacts of human-subsidized predators.

2.13.0.7 Develop, implement, monitor and evaluate management strategies to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

2.13.0.8 Implement and assess management strategies to control and reduce the impacts of detrimental species and diseases that pose threats to native wildlife or communities.

2.14 Wildlife disease management

2.14.0 Wildlife disease strategy development and investigation

2.14.0.1 Investigate diseases/pathogens impacting SGCN and/or their habitats.

2.14.0.2 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.6 Conduct long-term studies on resident and migratory SGCN to determine if there are changes to the populations' demography (productivity, survival, dispersal) and/or to their critical and/or supporting habitats (i.e., diminishing in value, acreage or connectivity, etc.), in particular changes that would not maintain SGCN at viable levels for species populations. Update data and GIS maps; provide updated information to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.9 Identify SGCN (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources, and compile/collect and evaluate data/information regarding potential management strategies to improve the availability of such SGCN's food resources.

3.0.0.10 Conduct long-term studies to evaluate the effectiveness of management strategies implemented to enhance food/prey availability for SGCN [whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources] through studies that investigate the populations and health of the food resources as well as the target SGCN. Revise management strategies as needed and continue to monitor the effectiveness of the efforts.

3.0.0.11 Develop, implement and evaluate the effectiveness of town plans that avoid impacts to SGCN species and their habitats.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.25 Identify pathways of migratory SGCN in the Atlantic Coastal and Marine Regions (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and use the data to help evaluate the potential short- and long-term impacts of wind turbines, radio towers, utility guy lines, and other tall coastal structures on migratory populations.

3.0.0.26 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species including objectives and guidance pertaining to and the condition/status of critical and supporting habitats.

3.0.0.30 Conduct research to investigate the feasibility of managing and/or creating roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

3.0.0.31 Conduct short- and long-term studies (e.g., wildlife surveys and habitat assessments) to evaluate the effectiveness of vegetation management efforts to maintain, enhance and/or create roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.2 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.0.5 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

3.2.0.10 Evaluate the effectiveness of sanitation/decontamination protocols in minimizing the transference of wildlife diseases and invasive plant species.

3.2.0.11 Investigate the impacts of ORV use as a mechanism to spread wildlife diseases and invasive plant species to native wildlife and habitats. Integrate this information when mapping undeveloped roads and trails to identify potentially sensitive areas in northern NJ forests.

3.2.0.17 Conduct monitoring at constructed wind farms (within or outside of NJ) to assess the impacts on migratory species (birds, bats, insects) and determine if NJ's land use planning efforts and/or smart-growth plans need to be revised.

3.2.0.24 Develop, implement and evaluate the effectiveness of BMPs for lighting of/on tall structures that minimize harm to and/or disorient wildlife, in particular but not limited to migratory birds, bats and invertebrates. Implement BMPs into state, county and local permitting processes.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.8 Assess the availability and suitability of forest habitats for SGCN species (particularly reptiles and amphibians, birds, pollinators, and tiger beetles) in southern forests since Superstorm Sandy.

3.3.1.9 Inventory forests throughout northern New Jersey to develop a baseline characterization of the structure and composition of habitats and identify deficient forest habitat types.

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.2 Monitoring

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.8 Evaluate the effectiveness of current prescribed burning practices on Pinelands dependent species.

3.3.2.9 Investigate the effectiveness of various silviculture techniques for enhancing forests for forest-dependent SGCN.

3.3.2.10 Evaluate the efficacy and success of different management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.3.2.15 Investigate the effectiveness of management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.3.2.20 Once a system is developed for reporting and qualifying new locations of invasive species, develop, implement and monitor/evaluate invasive species removal strategies at identified locations. Priority should be given to those areas critical to SGCN and/or contain unique and/or rare plant communities supporting SGCN and/or other fish/wildlife species.

3.3.2.24 Conduct regular inventories of forests throughout northern New Jersey to characterize the changing structure and composition of habitats and monitor forest conditions.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.3 Develop/improve management techniques that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.8 Develop best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5.3.9 Develop strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.3.19 Work with foresters to develop prescribed burning practices for Pinelands dependent species that increase or maintain habitat quality for these species in the Pinelands.

3.5.3.20 Develop guidance on various silviculture techniques for enhancing forests for forest-dependent SGCN.

3.5.3.21 Develop management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.24 Based on research, modify management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.2 Develop, implement, monitor and evaluate management strategies to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

3.5.4.10 Develop BMPs for lighting of/on tall structures that minimize harm to and/or disorientation of wildlife, in particular but not limited to migratory birds, bats and invertebrates.

3.5.4.14 Develop and implement agreements, and update existing agreements, with government agencies regarding the protection of critical SGCN habitats (e.g., significant breeding populations of beach nesting birds, colonial waterbird nesting areas, bat colonies, etc.).

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.17 Investigate new, non-invasive techniques for SGCN population evaluation through literature review, expert opinion, trial studies (if low risk), etc.

3.5.4.18 Investigate the effectiveness of survey techniques through selected “ground truthing” and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

4 Education

4.1 Educator/Instructor training

4.1.0 Public education

4.1.0.1 Provide educational resources and training programs to private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

5 Facilities and Areas

5.15 Wildlife Management Areas

5.15.6 Roads

5.15.6.1 Clearly post areas/roads where vehicle access is permitted.

5.15.6.2 Clearly post areas/trails where vehicle access is not permitted.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.1 Enhance and increase the effective size of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates by securing adjacent habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.3 Secure and protect riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.5 Secure and protect critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.1 Promote the protection of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates and enhance these lands by increasing the effective size through conservation area designations of stopover habitats and adjacent private lands.

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.3 Increase the protection of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through conservation area designations.

6.3.0.5 Promote the protection of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through conservation area designations.

6.4 Private lands agreements

6.4.0 Private land agreement strategies

6.4.0.1 Enter into private lands agreements to expand control burns on private lands, in particular those adjacent to conserved lands to improve SGCN habitats.

7 Law Enforcement

7.1 Law enforcement

7.1.4 Scale Unspecified

7.1.4.4 Improve enforcement of policies/regulations aimed at protecting and preserving critical coastal and marsh habitats, and secure mitigation for losses that create an environmental benefit.

7.1.4.5 Enforce current policies and/or regulations to increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal SGCN, and implement and enforce amended policies/regulations.

7.1.4.7 Increase law enforcement presence to enforce regulations governing recreational activities (e.g., the use of personal watercraft and off road vehicles, caving, rock climbing, etc.) on conserved lands and within other sensitive habitats, and discourage activities that cause harm or disturbance to vegetation, wetlands, fish and wildlife.

7.1.4.8 Implement policies that protect critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates.

7.1.4.10 Implement policies that promotes expanding acreages and enhances the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

7.1.4.11 Implement and enforce policies/regulations that will increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.17 Improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

7.1.4.21 Implement regulations for lighting of/on tall structures that will minimize harm to and/or disorientation of wildlife, and enforce within state, county and local permitting processes.

7.1.4.22 Implement policies and/or regulations that prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

7.1.4.25 Encourage the enforcement of municipal laws regulating domestic pets that may predate on wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.4 Engage government agencies, conservation partners and other stakeholders in constructive dialogues encouraging them to influence policy change and the creation of incentives through a habitat bill and/or municipal ordinances for backyard habitat.

8.1.0.13 Engage DOD in a constructive dialogue regarding strategies to minimize disturbances to all SGCN (i.e., beyond their federal requirements) from forest management and other practices on their lands.

8.1.0.16 Engage local governments in discussions regarding the importance of them adopting/passing ordinances which require assessing and addressing secondary impacts (i.e., ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.21 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation human-subsidized and/or overabundant, native species cause to local nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.22 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation invasive species cause to native nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.26 Coordinate across federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to woodland landowners to adopt or endorse consistent best management practices concerning controlled burns to maintain and/or improve forested habitat for wildlife.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.33 Engage government agencies, conservation partners and other land managers, communities, landowners, and commercial and industrial stakeholders in discussions regarding the importance of protecting and methods to protect priority wetlands beyond the levels afforded through regulation by maintaining and/or restoring optimal biological buffers around wetlands.

8.1.0.37 Enlist landowners and NJ citizens in the protection of and survey efforts for SGCN, in particular rare species, by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management and wildlife-related volunteer programs.

8.1.0.38 Engage partners, stakeholders and land managers in constructive dialogue promoting forest stewardship for SGCN that use core forests and forested corridors.

8.1.0.44 Engage conservation partners, stakeholders, government agencies and other land stewards in constructive dialogues encouraging their inclusion of controlled burns in forest and other stewardship plans.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.1.0.48 Form cooperative partnerships with transportation and shipment agencies and companies to facilitate habitat creation and enhancement away from and outside of project areas and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.2 Recruitment and retention activities

8.2.3 For wildlife watching

8.2.3.1 Develop and implement nature-focused tourism opportunities including wildlife viewing sites, interpretive signage highlighting unique ecosystems/habitats, and wildlife-related recreational opportunities that do not negatively impact SGCN or their habitats.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.5 Develop and provide (or otherwise make publicly available) educational programs and/or materials that provide homeowners information on how to design dwellings and other structures in a manner that is wildlife friendly (e.g., using bird-safe glass on windows).

8.3.0.6 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners, land managers and local communities to discourage the presence of managed cat colonies and trap, neuter and release programs in wildlife habitats.

8.3.0.9 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners and land managers to include only native plants in landscaping and restoration projects. Provide information to assist them in detecting problematic establishment of invasive, non-indigenous plants.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.19 Develop an educational outreach program for the public on the devastating effects predators can have on native nesting wildlife.

8.3.0.25 Develop educational outreach programs for landowners, nurseries and the general public regarding the negative impacts of invasive and non-native plants on our natural communities.

8.3.0.26 Develop educational outreach programs for private and public landowners and land managers regarding the importance of and how to manage core forests and forested corridors in a way that will be beneficial for SGCN, particularly endangered, threatened and special concern species.

8.3.0.27 Develop educational outreach programs for public and private landowners and land managers regarding the importance of structural habitat diversity, methods to increase diversity, and/or incentive programs available to increase habitat diversity.

8.3.0.30 Develop educational outreach programs for private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.5 Develop a plan that directs the creation or expansion of energy or utility rights-of-way in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.6 Develop a plan that directs the creation or expansion of roads and railroads or the re-establishment of abandoned railroads within and adjacent to critical forested habitats in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.7 Develop a plan that directs the maintenance of or new channelization of forested streams and rivers in a manner that minimizes impacts of the aquatic ecological system and adjacent forest

9.1.0.9 Develop a plan that focuses on strategies to minimize the creation of renewable energy farms (e.g., solar, wind) and related infrastructures within and their impacts on forested habitats and the wildlife community.

9.1.0.10 Develop a plan that focuses on strategies to minimize the impacts of mining on critical forested habitats.

9.1.0.11 Develop a plan that focuses on strategies to minimize the impacts of power plants on critical forested habitats and the wildlife community.

9.1.0.13 Develop a plan to minimize agriculture that would result in groundwater withdrawal in critical forested areas.

9.1.0.14 Develop a plan to minimize development that would result in groundwater withdrawal in critical forested areas.

9.1.0.16 Develop a plan to minimize new lawnscapes and preserve natural vegetation within and adjacent to critical forest areas.

9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

9.1.0.20 Develop a plan to minimize the impacts of existing agricultural properties adjacent to and the conversion of forest habitats (terrestrial and aquatic, within or adjacent to critical forests) to agriculture, grazing areas/livestock farms, and plantations.

9.1.0.21 Develop a plan to minimize the use of any-sized dam in critical forested areas.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.24 Develop a plan to prevent livestock from entering water bodies in critical forested habitats.

9.1.0.25 Develop a plan to prevent the conversion of forested stream buffers to pastures in critical forested habitats.

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.31 Develop wetland restoration plans that consider the life history and needs of wildlife occupying targeted habitats.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.7 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.16 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.2 Listed species recovery planning

9.3.2.1 Develop proactive species recovery plans for all endangered and threatened species including guidance and objectives pertaining to critical and supporting habitat to meet and maintain recovery goals.

9.3.3 Habitat management planning

9.3.3.6 Develop a management plan for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

9.3.3.7 Develop a management plan to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

9.3.3.8 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.3.9 Develop a response plan to outbreaks using BMPs to control infestations and limit their spread in a way that avoids excessive harm to non-target species.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.3.13 Develop a management plan that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas and prevents or ameliorates near-term impacts of climate change throughout the State, but in particular within the coastal and Delaware Bay areas.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.17 Develop a management plan for prescribed burning that will benefit Pinelands dependent species and increase or maintain habitat quality for these species in the Pinelands.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.20 Develop an action plan for immediate implementation should habitat levels fall below the minimum necessary size and/or structure within the Cape May Peninsula to sustain the avian migration.

9.3.3.21 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.3.24 Develop a plan to improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

9.3.3.29 Develop habitat management plans aimed at reducing or eliminating negative impacts of ORVs.

9.3.3.32 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3.34 Include controlled burn prescriptions in forest and stewardship plans to improve wildlife habitat.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.3 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.10 Use CHANJ mapping in reviews of proposed energy, mining, transportation and utility service companies/agencies' projects to attempt to maintain habitat connectivity and reduce fragmentation, and identify potential impacts of the projects.

11.1.1.11 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed offshore energy projects relating to drilling, extraction and distribution of petroleum and gas products to reduce habitat destruction and minimize impacts on wildlife.

11.1.1.12 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed solar farm projects to reduce habitat fragmentation and minimize impacts on wildlife.

11.1.1.13 Use the best available science (species data, habitat present, wind farm layout options, wind blade impacts on migratory species, location of migration routes, etc.) when conducting regulatory reviews of proposed wind farm projects to minimize impacts on migratory and resident wildlife and reduce habitat fragmentation.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.2 Provide technical support to public and private landowners and land managers for controlling invasive, native and non-native plant species in order to increase structural habitat diversity.

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.7 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on the importance of maintaining habitat connectivity, minimizing fragmentation, and the use of CHANJ products to help them target areas for such planning.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.14 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters), and to enhance or restore biologically appropriate buffers.

11.2.0.20 Provide educational resources and technical support to public and private landowners and land managers to promote the protection and/or enhancement of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN.

11.2.0.21 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates to promote the protection and/or enhancement of those adjacent habitats to increase the effective size of the migratory habitat.

11.2.0.22 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

11.2.0.23 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to SGCN habitats to promote the protection and/or enhancement of those adjacent habitats to increase the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and that connect conserved SGCN habitats.

11.2.0.25 Provide educational resources, training programs, and on-the-ground guidance to resource managers regarding the assessment of and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) related to residential and commercial development.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.1 Engage partners and stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.3 Provide educational resources, training programs, and on-the-ground guidance to DOD to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop and implement forest management and other practices that minimize disturbances to SGCN (i.e., beyond their federal requirements).

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

100 Law and Policy

100. Legislation

100.1.3 Sub-national Level

100.1.3.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.4 County and Local

100.1.4.1 Enhance critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates through the local ordinances of adjacent private lands to increase the effective size of the habitat.

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.3 Expand the acreages and enhance the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN through local ordinances.

100.1.4.4 Secure wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and biologically appropriate buffers through local ordinances.

100.1.4.5 Secure SGCN-inhabited/used freshwater wetlands and biologically appropriate buffers through local ordinances.

100.1.4.8 Secure critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through local ordinances.

100.1.4.13 Encourage municipal laws regulating domestic pets that may predate on wildlife.

100.1.4.14 Adopt/pass local ordinances which require assessing and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.5.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100.1.5.5 Develop legislation to provide financial support for the New Jersey Invasive Species Strike Team.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.3 Develop policies that will promote the long term protection of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates.

100.3.0.5 Develop policies that will promote improved and secure habitat connections between conserved SGCN habitats.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.7 Amend current policies and/or regulations to increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.14 Develop policies and/or regulations that increase the protective buffers of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) to biologically appropriate distances to benefit SGCN that rely upon these habitats and improve the function of the [associated] aquatic systems.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.19 Develop regulations for lighting of/on tall structures that will minimize harm to and/or disorientation of wildlife, in particular but not limited to migratory birds, bats and invertebrates. Implement BMPs into state, county and local permitting processes.

100.3.0.20 Develop policies and/or regulations that prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

100.3.0.23 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.31 Create or expand tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMPs.

100.3.0.32 Coordinate regulations across agencies to maximize availability of and enrollment in existing Forestry Stewardship Programs (e.g., "Woodland Stewards", Farm Bill, partners, etc.) to maintain and/or improve forest habitat.

100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.

100.3.0.42 Fully adopt the former Storm water Management Rules' 300ft buffer requirements into the Flood Hazard Area Control Act Rules.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.45 Increase the controlled burn season to focus on restoring vegetative communities.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.48 Propose new State law or regulation mandating that a State-level "development impact fee" be assessed on all new development approved by municipalities (via the Municipal Land Use Law processes), and dedicate such monies to the development and implementation of regional Habitat Conservation Plans (or existing plans/programs serving the same regional function).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.53 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded rights-of-way corridors associated with energy transport/transmission.

100.3.0.54 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded surface mining areas.

100.3.0.56 Develop regulations that when implemented will protect critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates.

100.3.0.57 Develop regulations that when implemented will improve and secure habitat connections between conserved SGCN habitats.

100.3.0.58 Develop regulations that when implemented will promote the expansion of acreages and enhancement of the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.59 Develop regulations that when implemented will increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.67 Develop regulations for lighting of/on tall structures that will minimize harm to and/or disorientation of wildlife, and enforce within state, county and local permitting processes.

100.3.0.68 Develop regulations that when implemented will prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100.3.0.73 Develop regulations that would exempt the conversion of lawns to native vegetation (beneficial to wildlife) from local lawn ordinances.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.4 Create a policy that requires the use of wildlife habitat and corridor mapping products for both regulatory use when conducting project reviews and planning/siting new or expanded rights-of-way projects.

100.4.0.9 Develop and implement policies to minimize the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats in order to benefit wildlife.

100.4.0.13 Develop policies for different circumstances (e.g., roadsides and medians, riparian, aquatic and terrestrial habitats) that outline appropriate habitat/vegetation management strategies and schedules to minimize risks to and benefit wildlife.

100.4.0.16 Develop policies to implement habitat management strategies that will increase the structural diversity surrounding areas used for energy, mining, and transportation and service corridors which include but are not limited to the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-

100.4.0.17 Develop policies to implement habitat management strategies, including prescribed burns, that will increase the structural diversity on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies to control and reduce the impacts of invasive, non-native species in order to increase structural habitat diversity.

100.4.0.18 Develop policies to minimize the extent of infrastructure associated with energy and service corridors or areas (e.g., wind and solar farms, pipelines, utility lines) and that require the implementation of habitat management strategies that will increase the structural diversity in the area including (e.g., the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides).

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.24 Develop policies to provide financial support for the New Jersey Invasive Species Strike Team.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Young Forest Birds

Focal species that comprise this Conservation Target:

American Woodcock | Blue-winged Warbler | Golden-winged Warbler
Northern Bobwhite

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 2.25)

NJ Specific Threats:
- 1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.1.1.2 Loss, alteration and/or degradation of habitat.
- 1.1.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.
- 1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.1.2 Residential development using materials that cause collision hazards (Avg. Score: 1.50)

NJ Specific Threats:
- 1.1.2.1 Collision risk to volant species (birds, bats and invertebrates).

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 2.25)

NJ Specific Threats:
- 1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.2.1.2 Loss, alteration and/or degradation of habitat.
- 1.2.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.
- 1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.2.2 Commercial development using materials that cause collision hazards (Avg. Score: 1.50)

NJ Specific Threats:
- 1.2.2.1 Collision risk to volant species (birds, bats and invertebrates).

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 1.75)

NJ Specific Threats:
- 1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.3.1.2 Loss, alteration and/or degradation of habitat.
- 1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture (Avg. Score: 1.50)

NJ Specific Threats: 2.1.1.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.1.5 Lack of competitive market prices to maintain native grasslands causes conversion to other crops that have more monetary value but less value as wildlife habitat.

2.1.2 Small-holder Farming (Avg. Score: 1.75)

NJ Specific Threats: 2.1.2.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.2.2 Fragments terrestrial and aquatic habitats.

2.1.2.3 Agricultural practices (e.g., mechanized, row-crop agriculture) can render lands unsuitable for most wildlife due to soil degradation and erosion.

2.1.2.4 Agricultural practices (e.g., mechanized, row-crop agriculture) can cause direct mortality to wildlife when harvesting takes places.

2.1.2.5 Lack of competitive market prices to maintain native grasslands causes conversion to other crops that have more monetary value but less value as wildlife habitat.

2.1.3 Agro-industry (Avg. Score: 2.75)

NJ Specific Threats: 2.1.3.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.3.2 Fragments terrestrial and aquatic habitats.

2.1.3.3 Agricultural practices (e.g., mechanized, row-crop agriculture) can render lands unsuitable for most wildlife due to soil degradation and erosion.

2.1.3.4 Agricultural practices (e.g., mechanized, row-crop agriculture) can cause direct mortality to wildlife when harvesting takes places.

2.1.3.5 Loss of ecotones by implementing clean farming (edge-to-edge) practices degrades habitat for early successional wildlife.

2.1.3.6 Lack of competitive market prices to maintain native grasslands causes conversion to other crops that have more monetary value but less value as wildlife habitat.

2.2 Wood and Pulp Plantations

2.2.1 Small Holder (Avg. Score: 1.00)

NJ Specific Threats: 2.2.1.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.2.1.2 Tree harvesting can cause direct mortality to wildlife, especially if done during peak activity periods or vulnerable life stages (e.g., denning, nesting, gestation/birthing, basking, roosting, pre-volancy, etc.).

2.2.2 Agro-industry Plantations (Avg. Score: 1.50)

NJ Specific Threats: 2.2.2.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.2.2.2 Tree harvesting can cause direct mortality to wildlife, especially if done during peak activity periods or vulnerable life stages (e.g., denning, nesting, gestation/birthing, basking, roosting, pre-volancy, etc.).

2.3 Livestock Farming and Ranching

2.3.2 Small-holder Grazing (Avg. Score: 1.75)

NJ Specific Threats: 2.3.2.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.2.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

2.3.3 Agro-industry Grazing (Avg. Score: 2.00)

NJ Specific Threats:
- 2.3.3.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.
- 2.3.3.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

3 Energy Production and Mining

3.1 Oil and Gas Facilities and Pipelines

3.1.1 Distribution processes of petroleum and other liquid hydrocarbons (Avg. Score: 1.25)

NJ Specific Threats:
- 3.1.1.1 Fragments terrestrial and aquatic habitats.
- 3.1.1.2 Loss, alteration and/or degradation of habitat.
- 3.1.1.3 Increased risk of oil spills.
- 3.1.1.4 Increased noise pollution.
- 3.1.1.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.

3.1.2 Natural gas distribution processes (Avg. Score: 1.25)

NJ Specific Threats:
- 3.1.2.1 Fragments terrestrial and aquatic habitats.
- 3.1.2.2 Loss, alteration and/or degradation of habitat.
- 3.1.2.3 Increased risk of gas leaks and explosions.
- 3.1.2.4 Increased noise pollution.
- 3.1.2.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.

3.2 Mining and Quarrying

3.2.2 Surface Mining - Rock Quarry (and sand quarries) (Avg. Score: 2.00)

NJ Specific Threats:
- 3.2.2.1 Fragments terrestrial and aquatic habitats.
- 3.2.2.2 Loss, alteration and/or degradation of terrestrial and aquatic habitats.
- 3.2.2.3 Increased risk of vehicle strikes/mortality to wildlife.

3.3 Renewable Energy

3.3.1 Wind Power (Avg. Score: 1.50)

NJ Specific Threats:
- 3.3.1.1 Turbines, blades, and structure foundations create a collision risk to volant species (birds, bats and invertebrates) and marine animals.
- 3.3.1.2 Fragments terrestrial habitats.
- 3.3.1.3 Loss, alteration and/or degradation of habitat.

3.3.2 Solar Power (Avg. Score: 2.00)

NJ Specific Threats:
- 3.3.2.1 Fragments terrestrial habitats.
- 3.3.2.2 Loss, alteration and/or degradation of habitat.

3.4 Conventional Power Plants

3.4.0 Conventional Power Plants (Avg. Score: 1.00)

NJ Specific Threats:
- 3.4.0.2 Loss, alteration and/or degradation of habitat due to new or the expansion of current facilities.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 4.1.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species and inhibiting dispersal of non-volant animals, reducing gene flow.

4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.1.1.4 Re-establishment of abandoned railroad lines may increase the risk of direct mortality on wildlife.

4.1.2 Movement of cars and other vehicles on roads and railroads (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats: 4.1.2.1 Increased vehicle traffic increases the risk of wildlife mortality from strikes.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads (Avg. Score: 1.00)

NJ Specific Threats: 4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

4.2.1.5 Tall radio and utility towers with guy lines pose a strike hazard for migrant bats and birds, especially in poor visibility conditions (e.g., fog, nighttime, poor weather conditions).

4.2.2 Management of rights-of-way or communication tower facilities and/or their associated access roads (Avg. Score: 2.25)

NJ Specific Threats: 4.2.2.1 Improper or poorly scheduled vegetation management can cause direct mortality to and may reduce productivity of wildlife.

4.4 Flight Paths

4.4.1 Airplane flight paths (Avg. Score: 1.00)

NJ Specific Threats: 4.4.1.1 Increased noise disturbance to wildlife, disrupting their normal behaviors.

4.4.1.2 Increased risk of collision between airplanes and birds, bats and insects.

5 Biological Resource Use

5.1 Hunting and Collecting Terrestrial Animals

5.1.1 Intentional Use (Avg. Score: 1.00)

NJ Specific Threats: 5.1.1.2 Legal but excessive harvest of SGCN game species.

5.1.2 Unintentional effects (Avg. Score: 1.50)

NJ Specific Threats: 5.1.2.2 Disruption of normal wildlife behavior.

5.2 Gathering Terrestrial Plants

5.2.2 Unintentional effects (Avg. Score: 1.00)

NJ Specific Threats: 5.2.2.1 Stepping on nests or young/hatchling animals.

5.2.3 Control (Avg. Score: 1.00)

NJ Specific Threats: 5.2.3.2 Clearing of scrub-shrub vegetation [and snags] diminishes cover and nesting habitat.

5.3 Logging and Wood Harvesting

5.3.1 Intentional Use (subsistence/small scale) (Avg. Score: 1.50)

NJ Specific Threats: 5.3.1.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.1.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.1.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.1.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.1.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.2 Intentional Use (large scale) (Avg. Score: 1.50)

NJ Specific Threats:

5.3.2.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.2.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.2.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.2.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.2.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.3 Unintentional effects (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats:

5.3.3.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4 Unintentional effects (large scale) (Avg. Score: 2.00)

NJ Specific Threats:

5.3.4.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4.2 Extensive infrastructure and larger equipment requirements present a potential risk of direct injury/mortality to wildlife.

5.3.4.4 Infrastructure and/or equipment use may result in subtle changes to drainage patterns, adversely affecting vernal pool and wetland hydrology.

5.3.4.5 Lack of appropriate, sustainable forest management can lead to a decrease in forest habitat diversity, degraded habitat for many forest species, the loss of habitat for early-successional species, and/or the loss of unique habitats for species that need canopy breaks and multi-aged tree composition to fulfill various life history requirements.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized) (Avg. Score: 2.00)

NJ Specific Threats:

6.1.1.1 Inappropriate use of off-road vehicles creates new roads/trails which fragments habitat.

6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.

6.1.1.3 Increased risk of harassment that results in a change in wildlife behavior and/or direct mortality from vehicle strikes.

6.1.1.4 Increased noise pollution.

6.1.1.6 Off-road vehicles can be a mechanism of transference of wildlife diseases and invasive plant species if gear and apparel are not properly sanitized between sites.

6.1.5 Wildlife observation and photography (Avg. Score: 1.00)

NJ Specific Threats: 6.1.5.1 Improperly conducted recreational activities may disrupt normal wildlife behaviors which can result in reduced reproductive success or survival, abandonment of critical sites, etc.

6.1.5.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.1.7 Other (Avg. Score: 1.00)

NJ Specific Threats: 6.1.7.1 Use of recreational or commercial pyrotechnics may cause temporary disturbance to wildlife, in particular to nesting birds.

6.1.7.3 Drone use in areas with sensitive wildlife (e.g., nesting and foraging birds, migrating and foraging/feeding whales) can alter their behavior and can cause disturbance that impacts their reproductive and/or foraging success.

6.2 Military Exercises

6.2.1 Military exercises (Avg. Score: 1.00)

NJ Specific Threats: 6.2.1.1 Military testing and training exercises may inflict disturbance and potential physical harm to wildlife.

6.2.1.3 Lack of opportunity for non-federal wildlife managers to influence activities on military bases may result in detrimental impacts to SGCN and/or missed opportunities to engage in projects that benefit SGCN.

6.3 Work and Other Activities

6.3.1 Unauthorized research projects at significant habitats (Avg. Score: 1.00)

NJ Specific Threats: 6.3.1.1 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.1.2 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.1.3 Activities conducted without proper precautions may disturb and disrupt normal wildlife behaviors, which may impact reproductive success or survival, cause abandonment of critical sites, etc.

6.3.2 Authorized research projects at significant habitats (Avg. Score: 1.00)

NJ Specific Threats: 6.3.2.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.2.3 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.2.4 Activities conducted without proper precautions may disturb and disrupt normal wildlife behaviors, which may impact reproductive success or survival, cause abandonment of critical sites, etc.

6.3.3 Other "work" unrelated to research (Avg. Score: 1.00)

NJ Specific Threats: 6.3.3.4 Workers may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

7 Natural Systems Modifications

7.1 Fire and Fire Suppression

7.1.1 Increase in Fire Frequency/Intensity (Avg. Score: 1.00)

NJ Specific Threats: 7.1.1.1 Increase in frequency and intensity of wild fires as a result of droughts and heat waves drying out vegetation and litter.

7.1.1.2 Increase in frequency of wild fires as a result of illegal activities.

7.1.1.3 Unnatural fire regimes occurring as a result of military exercises.

7.1.2 Suppression of Fire Frequency/Intensity (Avg. Score: 3.00)

NJ Specific Threats: 7.1.2.1 Shift in vegetative communities as a result of suppression of natural fires.

7.1.2.2 Lack of diversity in age structure and composition of vegetation due to the suppression of fire.

7.2 Dams and Water Management/Use

7.2.1 Abstraction of Surface Water (domestic use) (Avg. Score: 0.75)

NJ Specific Threats: 7.2.1.5 Abstraction of surface water may deplete upland mesic habitats of water needed by plants and wildlife.

7.2.2 Abstraction of Surface Water (commercial use) (Avg. Score: 0.75)

NJ Specific Threats: 7.2.2.5 Abstraction of surface water may deplete upland mesic habitats of water needed by plants and wildlife.

7.2.3 Abstraction of Surface Water (agricultural use) (Avg. Score: 0.75)

NJ Specific Threats: 7.2.3.6 Abstraction of surface water may deplete upland mesic habitats of water needed by plants and wildlife.

7.2.5 Abstraction of Ground Water (domestic use) (Avg. Score: 1.50)

NJ Specific Threats: 7.2.5.2 Abstraction of ground water may deplete upland mesic habitats of water needed by plants and wildlife.

7.2.6 Abstraction of Ground Water (commercial use) (Avg. Score: 1.50)

NJ Specific Threats: 7.2.6.2 Abstraction of ground water may deplete upland mesic habitats of water needed by plants and wildlife.

7.2.7 Abstraction of Ground Water (agricultural use) (Avg. Score: 1.25)

NJ Specific Threats: 7.2.7.2 Abstraction of ground water may deplete upland mesic habitats of water needed by plants and wildlife.

7.2.13 Stream Burial (Avg. Score: 1.50)

NJ Specific Threats: 7.2.13.1 Eliminates riparian habitats.

7.2.13.2 Eliminates in-stream habitat and water resources for wildlife.

7.3 Other Ecosystem Modifications

7.3.2 Inappropriate timing of mowing (Avg. Score: 2.00)

NJ Specific Threats: 7.3.2.1 Increased risk of direct mortality and/or reduced productivity of wildlife, as well as reduced use by migrating species.

7.3.3 Removal of coarse woody debris (streams, forests, scrub-shrub habitats) (Avg. Score: 1.50)

NJ Specific Threats: 7.3.3.3 Removal of dead trees (snags), large felled logs (i.e., those > 12" dbh), and other downed woody material diminishes nesting, roosting, and sheltering options for wildlife, and increases the ease at which deer can browse regenerating vegetation.

7.3.4 Lack of natural disturbance patterns or ecosystem functions due to species loss (Avg. Score: 2.00)

NJ Specific Threats: 7.3.4.1 The management and/or loss of beavers decreases natural disturbance patterns.

7.3.4.2 The loss of top-tier predators results in an overabundance of prey species which alter or degrade the natural function of the ecological system.

7.3.4.5 The lack of forest disturbance minimizes the diversity of herbaceous vegetation and other shrubs and trees that need a lot of sunlight to grow.

7.3.5 Poor habitat management (Avg. Score: 3.00)

NJ Specific Threats:

7.3.5.1 Improper or poorly scheduled maintenance of man-made corridors (e.g., roadsides and medians) can cause direct mortality to and may reduce productivity of wildlife.

7.3.5.5 Habitat management that alters or removes vegetation without implementing long-term management increases the risk of invasive and exotic plants establishing themselves, outcompeting native vegetation.

7.3.5.6 Habitat management, including that which occurs on public and private lands, that does not consider timing and species' behaviors can result in the direct mortality and/or alteration or loss of habitat.

7.3.5.10 Ditching, draining and filling of marshes and wetlands eliminates habitat and degrades the remaining surrounding areas for wildlife.

7.3.5.12 Lack of diversity in age structure and composition of vegetation due to lack of natural disturbances and/or vegetation management.

7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

7.3.5.17 Decreased diversity in height and species of herbaceous vegetation resulting in reduced cover and food for nesting and foraging wildlife.

7.3.5.18 Lack of funding or competitive market prices to maintain native grasslands for grassland-dependent species causes conversion of fallow or hay fields to other crops or shrublands.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species (Avg. Score: 2.00)

NJ Specific Threats:

8.1.1.1 Displace or outcompete native species for resources.

8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.

8.1.1.3 Invasive, non-native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

8.1.1.4 Invasive, non-native animals increase the risk of predation on native animals and/or herbivory on native vegetation.

8.1.1.5 Invasive, non-native animals and plants increase the risk of introduction and transference of diseases

8.1.4 Invasive non-native terrestrial/wetland animals (Avg. Score: 2.00)

NJ Specific Threats:

8.1.4.1 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.4.2 Free-roaming and feral domestic animals such as cats and dogs causes direct mortality of wildlife and disturbance to wildlife breeding and resting areas.

8.1.5 Invasive non-native terrestrial/wetland plants (Avg. Score: 2.50)

NJ Specific Threats:

8.1.5.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.2 Problematic Native Species/Diseases

8.2.1 Unspecified Species (Avg. Score: 2.00)

NJ Specific Threats: 8.2.1.1 Overabundant native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

8.2.1.2 Invasive pathogens and insects may increase in range and abundance as limiting factors (such as temperature) are altered as a result of climate change.

8.2.1.4 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.2.2 Named Species (Avg. Score: 2.00)

NJ Specific Threats: 8.2.2.2 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.3 Introduced Genetic Material

8.3.0 Introduced Genetic Material (Avg. Score: 1.25)

NJ Specific Threats: 8.3.0.1 Introduction of farm-reared species (e.g., bobwhite and brook trout) for hunting and fishing purposes introduces genetic material into the native population when species hybridize.

8.3.0.2 Species hybridizing as a result of the alteration of, and subsequent connectivity of, habitats that once separated species.

8.5 Viral/Prion-induced Diseases

8.5.2 Named Species (Disease) (Avg. Score: 1.00)

NJ Specific Threats: 8.5.2.1 Diseases such as West Nile Virus, arenavirus, sudden oak death, Avian Influenza, and snake fungal disease cause morbidity or mortality to native populations.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.1 Domestic and Urban Waste Water

9.1.1 Sewage (Avg. Score: 1.00)

NJ Specific Threats: 9.1.1.3 Contaminants in sewage treatment effluents and Combined Sewer Overflows can cause developmental and behavioral abnormalities and reproductive failure in wildlife.

9.1.2 Run-off (Avg. Score: 1.50)

NJ Specific Threats: 9.1.2.3 Contaminants from road runoff (oil, sediment, salt, etc.) impact native vegetation and the species that rely upon them, degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2 Industrial and Military Effluents

9.2.1 Oil Spills (Avg. Score: 1.00)

NJ Specific Threats: 9.2.1.1 Oil spills render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.1.2 Oil spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.3 Other (Avg. Score: 1.00)

NJ Specific Threats: 9.2.3.1 Point and nonpoint source pollution such as polychlorinated biphenyls (PCBs), pesticides, heavy metals, and endocrine disrupting compounds (EDC's) into freshwater and marine systems pose threats to wildlife through direct contact and/or ingestion, and to aquatic species and their predators through bioaccumulation, impacting the reproductive success and neurological function of many avian and fish species.

9.2.3.2 Chemical spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.3.3 Chemical spills may render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.4 Other: Hydrofracturing (Avg. Score: 1.00)

NJ Specific Threats: 9.2.4.1 Contaminants from hydrofracturing degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2.4.2 Uncontrolled effluents escaping from hydrofracturing facilities can cause injury to wildlife and alter normal behaviors.

9.3 Agricultural and Forestry Effluents

9.3.2 Soil Erosion and Sedimentation (Avg. Score: 0.75)

NJ Specific Threats: 9.3.2.2 Soil erosion and sedimentation limit the re-establishment of plants needed by terrestrial wildlife as cover and a food base.

9.3.3 Herbicides and Pesticides (Avg. Score: 1.75)

NJ Specific Threats: 9.3.3.1 Pesticides degrade terrestrial and aquatic habitats, especially streams, ponds and wetlands. Aquatic wildlife are particularly sensitive to these contaminants, which can cause developmental and behavioral abnormalities and reproductive failure. Some contaminants may bioaccumulate in predatory fish and birds and disrupt reproduction.

9.3.3.3 Use of pesticides can directly harm non-target species through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture (Avg. Score: 1.50)

NJ Specific Threats: 9.3.5.3 Use of pesticides and herbicides can minimize the abundance of invertebrates needed as a food source for many birds.

9.3.5.4 Improper use of current insecticides, such as those containing esfenvalerate, prallethrin, or piperonyl butoxide, or past use of pesticides containing chlordane still present in the soils, are toxic to various wildlife species, and can cause injury, mortality, or other effects that impair population viability.

9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.5 Air-Bourne Pollutants

9.5.1 Acid Rain (Avg. Score: 2.00)

NJ Specific Threats: 9.5.1.1 Causes acidification of water bodies, resulting in changes to aquatic and marine communities and reducing biodiversity, and creating conditions that are unsuitable for some aquatic (freshwater and marine) and semi-aquatic species that are sensitive to pH shifts.

9.5.1.2 Leaches calcium from the soils which in turn reduces the availability of prey, particularly calcium-rich prey such as snails.

9.5.2 Smog (Avg. Score: 1.00)

NJ Specific Threats: 9.5.2.1 Fine airborne particulate pollutants (such as smoke from controlled burns, soil particles from plowing arid soil, etc.) can adversely affect low mobility wildlife species, including avian species during nesting.

9.5.4 Other (Avg. Score: 0.50)

NJ Specific Threats: 9.5.4.1 Dust and/or airborne sedimentation from construction sites, agricultural operations or related earth disturbances can introduce mineral or organic sediments into adjacent wildlife habitats, degrading their quality and suitability for wildlife short-term and/or long-term.

9.5.6 Herbicides and Pesticides (Avg. Score: 2.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

9.6 Excess Energy

9.6.1 Light Pollution (Avg. Score: 1.25)

NJ Specific Threats: 9.6.1.1 Artificial lighting can reduce suitability of adjacent habitat for species sensitive to artificial lights by disorienting wildlife, reducing foraging suitability or success, or increasing visibility to predators, resulting in reduced diversity and/or productivity of species in adjacent habitat.

9.6.3 Noise Pollution (Avg. Score: 1.00)

NJ Specific Threats: 9.6.3.1 Acute and chronic noise pollution in and adjacent to terrestrial and aquatic (marine and freshwater) environments could disrupt normal behaviors of wildlife such as migration, communication, feeding, eluding predators, resting and breeding, etc.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 1.25)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.2 Droughts

11.2.1 Droughts (Avg. Score: 1.75)

NJ Specific Threats: 11.2.1.1 Contribute to hardened soils, decreasing water recharge during rains and increasing the likelihood of flash floods during storms.

11.2.1.2 Lead to lower groundwater levels and therefore, less available water for people and habitats.

11.2.1.3 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

11.3 Temperature Extremes

11.3.1 Temperature extremes (Avg. Score: 1.75)

NJ Specific Threats: 11.3.1.1 Increasing temperatures may cause habitat loss and degradation by desiccating and/or raising the temperatures of small wetlands and streams leading to the loss of freshwater mussels and other aquatic species and species reliant upon these habitats.

11.3.1.2 Increased temperatures can negatively impact wetland, riverine, lacustrine and vernal pool-associated or -dependent wildlife by reducing flows, increasing water temperatures, lowering water levels and causing premature drying of vernal habitats.

11.4 Storms and Flooding

11.4.1 Storms and flooding (Avg. Score: 1.50)

NJ Specific Threats: 11.4.1.5 Storm damage can alter forest structure via blow-downs or micro-bursts, and can destroy bird nesting in the locales where the storms occur.

11.4.1.6 Increased storms and flooding reduce nesting success, especially for ground-nesting birds.

11.4.2 Increased rainfall (Avg. Score: 1.50)

NJ Specific Threats: 11.4.2.2 Extreme rain events can damage wildlife nesting and resting habitats, including impacts to avian eggs and chick and small mammal survivorship.

11.4.2.3 More frequent rain events can alter terrestrial and wetland vegetation communities as well as wetland hydrology, shifting wildlife community use.

11.6 Phenology Shifting or Alteration

11.6.2 Phenology shifts related to predator-prey ecology (Avg. Score: 2.00)

NJ Specific Threats: 11.6.2.1 Alters inter-specific relationships (e.g., competition, parasitism, predation) of wildlife, ultimately leads to detrimental impacts on the ecological system.

11.6.2.2 Shifts timing of species migration, breeding and hibernation, and available food resources, causes redistribution of species, or mortality for species that are unable to relocate due to their already isolated habitat or limited mobility.

11.6.3 Phenology shifts related to species redistribution (Avg. Score: 1.50)

NJ Specific Threats: 11.6.3.1 Shifts in timing of species migration, breeding and hibernation, and available food resources, as a result of wildlife range shifts driven by climate change.

11.6.3.2 Shifts in nesting times or egg incubation durations can limit nest success and longterm populations.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 1.00)

NJ Specific Threats: 12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.6 Lack of information regarding migratory pathways and response of wildlife to lights and noise associated with offshore wind turbines.

12.1.2 Lack of up-to-date existing information (Avg. Score: 1.25)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.2.2 Lack of wildlife monitoring at sites with structures that pose high risk of mortality to SGCN wildlife.

12.1.3 Need to answer research question (Avg. Score: 1.25)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.3.4 Lack of information regarding the potential short- and long-term impacts of wind turbines and other tall coastal structures on migratory populations.

12.1.4 Need to develop new technique (Avg. Score: 1.00)

NJ Specific Threats: 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.

12.1.4.2 Improve and evaluate survey methods for species not easily detected through standard survey methods.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 2.00)

NJ Specific Threats: 12.3.0.1 Regulatory habitat protections within state land use regulations are spatially limited to specific geographic areas (e.g., Pinelands, Coastal Area) or geographic features (e.g., wetlands, streams) and so fail to protect critical habitats that exist outside of these regulated areas.

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.9 Prescribed burns implemented by the NJ Forest Fire Service are constrained by State air quality regulations to a timeframe where seasonal weather conditions are less than ideal for effective burning. As a result, the Forest Fire Service is limited in the number of overall prescribed burns it can implement to restore habitat for wildlife.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 2.00)

NJ Specific Threats:

12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.

12.4.0.5 Bureau of Forest Fire Management policy has traditionally implemented prescribed burns on State lands for the sole purpose of public safety (i.e., addressing hazard fuel reduction), missing opportunities to burn in a manner that would additionally manage habitat for ecological diversity.

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 1.75)

NJ Specific Threats:

14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 2.50)

NJ Specific Threats:

14.2.1.1 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various forest management practices.

14.2.1.5 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various wetland management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 2.00)

NJ Specific Threats:

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.1 Enhance critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates through incentive programs with adjacent private landowners to increase the effective size of the habitat.

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.3 Secure and promote the protection/restoration of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through incentive programs.

1.2.1.5 Secure and promote the protection/restoration of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through incentive programs.

1.2.1.6 Secure and promote the protection/restoration of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.9 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing Forestry Stewardship Programs.

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.12 Create incentives (non-monetary and/or monetary) for land developers to redevelop abandoned areas (e.g., shopping centers, office complexes) to minimize the loss of natural habitats and reduce the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.14 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of herbicides and pesticides, and implementing more ecologically safe strategies when using such products.

1.2.1.16 Create incentives (non-monetary and/or monetary) within State regulations (mitigations requirements or credit, BMP satisfaction, etc.) to promote the use of retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.17 Develop a public-relations oriented certification program for private retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.18 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and land managers to control and reduce the impacts of invasive, native and non-native species in order to increase structural habitat diversity.

1.2.1.19 Create incentives for federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to farmers, woodland landowners, and private landowners to adopt and/or endorse consistent BMPs concerning controlled burns to maintain and/or improve wildlife habitat.

1.2.1.20 Coordinate across government agencies and non-government organizations to create or expand upon tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMP's.

1.2.1.21 Create and/or support market-based programs that subsidize or create branding for products derived sustainably from managed wildlife habitats.

1.2.1.22 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to horse/livestock farm owners and managers to increase structural habitat diversity in and around the farms by managing vegetation for a variety of species, in particular, farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

1.2.1.23 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to provide cost shares and/or plan approvals for management based on management approaches and prescriptions.

1.2.1.24 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners, with habitat of suitable patch size to support breeding grassland-dependent species, to alter the timing of vegetation management to benefit grassland and pollinator species.

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

1.2.1.28 Create incentives to implement dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

2 Direct Management of Natural Resources

2.3 Fire management

2.3.2 Fuel reduction

2.3.2.1 Prevent wildfires by reducing natural fuel (e.g., leaf litter).

2.3.3 Prescribed burning

2.3.3.1 Evaluate different management techniques of prescribed burns that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

2.3.3.2 Conduct prescribed burning in Northern New Jersey forests to maintain and regenerate a mosaic of upland forest habitats.

2.3.3.3 Conduct prescribed burning to improve wildlife habitat.

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.1 Control invasive insect infestations by implementing BMP strategies through biological, chemical and/or mechanical means that will depress, or when appropriate, eradicate populations in a manner that avoids excessive harm to non-target species using BMPs to control infestations and limit their spread based on an inventory of invasive insect distribution and response to outbreaks.

2.8.0.2 Develop, implement, monitor and evaluate pest control/management strategies to reduce the impacts of over-abundant wildlife species (native and/or native, invasive species) on native vegetation and the degradation of habitats supporting SGCN. Over-abundant wildlife species include but are not limited to mute swans, Canada geese, beaver and white-tailed deer.

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.6 Implement long-term management of invasive and/or non-native plants to help maintain functioning ecological systems and biological diversity, and to enhance travel corridors. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.8 Protect significant natural and/or unique communities by implementing best management practices when conducting habitat restoration strategies.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.10 Minimize the loss of important habitats (e.g., coastal scrub-shrub and grassy habitats, high and low marsh habitats, etc.) that provide nesting, migrating, and wintering areas for SGCN birds and other coastal and marsh-dependent species through habitat restoration efforts.

2.10.0.11 Restore and/or enhance critical migratory terrestrial and aquatic habitats (e.g., beach, grasslands, forest, scrub-shrub, etc.) for songbirds, raptors, shorebirds, waterfowl, bats and invertebrates through habitat restoration efforts and expand habitat restoration to adjacent private lands to increase the effective size of the habitat.

2.10.0.12 Create and/or maintain scrub-shrub habitats through revegetation efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.21 Restore and/or enhance understory habitats that suppress invasive species and provide critical resources and enhance sheltering, foraging, and nesting cover for wildlife.

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.10.0.23 Restore and/or enhance roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.11.0.3 Create suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats through vegetation management.

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through vegetation management.

2.11.0.6 Reclaim degraded rare species habitats by conducting vegetation management needed to restore habitat value for the documented/target SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.8 Maintain, enhance and/or restore biologically appropriate buffers for SGCN-inhabited/used freshwater wetlands through vegetation management.

2.11.0.9 Minimize habitat loss of critical coastal habitats that provide nesting, migrating, and wintering areas for birds and other coastal species by maintaining or enhancing these areas through vegetation management.

2.11.0.12 Conduct vegetation management to create feeding and roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

2.11.0.13 Implement best management practices (BMPs), protective strategies, and guidelines for vegetation management to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.11.0.16 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.11.0.19 Implement forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN.

2.11.0.20 Create and/or maintain scrub-shrub habitats through management efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.11.0.21 Minimize the degradation, alteration and/or changes in hydrology of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and subsequent disturbances to and behavioral changes of wildlife by maintaining or enhancing these areas and biologically appropriate buffers through habitat management and/or revegetation or restoration efforts.

2.11.0.23 Implement appropriate habitat management actions in areas where natural disturbances, such as wildfire, have been precluded.

2.11.0.25 Conduct vegetation management along access roads following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.27 Conduct vegetation management for target shrub- or young forest-dependent SGCN following BMPs to minimize the risk of the establishment of invasive and non-native plants.

2.11.0.28 Conduct vegetation management in agricultural areas following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.29 Conduct vegetation management on transportation and service corridors (i.e., rights-of-way) following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.31 In areas where vegetative communities are shifting due to fire suppression and controlled burns are not feasible, manage vegetation to improve wildlife habitat.

2.11.0.32 Increase structural habitat diversity around and when feasible, within agricultural landscapes by managing vegetation for a variety of species, in particular, those farms that have removed scrub-shrub habitat and/or fragmented forests, and by implementing ecologically best practices (e.g., no-till farming, maintaining hedgerows, buffer set-asides, etc.).

2.11.0.33 Increase structural habitat diversity by implementing long-term vegetation management to minimize the potential for the establishment of invasive and/or non-native plants that may outcompete native vegetation.

2.11.0.34 Increase structural habitat diversity by managing residential, commercial and recreational areas' landscapes for a variety of species. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.

2.11.0.37 Increase structural habitat diversity by minimizing the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats which benefits wildlife.

2.11.0.38 Increase structural habitat diversity in and around horse/livestock farms by managing vegetation for a variety of species, in particular, in and around farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

2.11.0.39 Increase structural habitat diversity in and around solar farms by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.40 Increase structural habitat diversity surrounding areas used for energy, mining, and transportation and service corridors by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides, and avoid managing habitat during the breeding seasons for ground-nesting birds, reptiles, amphibians and small mammals.

2.11.0.41 Increase structural habitat diversity through the implementation of a variety of vegetation management practices such a prescribed burns (either increasing or decreasing their frequency depending on the site and objective), plantings, etc. that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.42 Increase structural habitat diversity within wind farms for terrestrial bound and low-flying species and around wind farms for other wildlife by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.43 Manage forests to increase variation in age structure and composition using BMPs that promote and maintain functioning ecological forest-based systems and biological diversity.

2.11.0.45 Regularly and/or rotationally create young forest habitat in targeted areas to maintain and regenerate a mosaic of upland forest habitats that will benefit shrub- and young forest-dependent species.

2.13 Wildlife damage management

2.13.0 Nuisance fish and wildlife damage

2.13.0.5 Investigate the impacts of human-subsidized and/or naturally occurring predator species on SGCN to assess the need for integrated wildlife damage management techniques (e.g., predator exclosures, fish blockages, electric fence, culls) and/or policy changes on state land management that minimize the impacts of human-subsidized predators.

2.13.0.6 Develop, implement and evaluate the effectiveness of predator-control techniques aimed at improving SGCN populations and methods to minimize the impact of those species carrying parasites or diseases that may impact SGCN (e.g., raccoon roundworm kills Allegheny woodrat).

2.13.0.7 Develop, implement, monitor and evaluate management strategies to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

2.13.0.8 Implement and assess management strategies to control and reduce the impacts of detrimental species and diseases that pose threats to native wildlife or communities.

2.14 Wildlife disease management

2.14.0 Wildlife disease strategy development and investigation

2.14.0.1 Investigate diseases/pathogens impacting SGCN and/or their habitats.

2.14.0.2 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.6 Conduct long-term studies on resident and migratory SGCN to determine if there are changes to the populations' demography (productivity, survival, dispersal) and/or to their critical and/or supporting habitats (i.e., diminishing in value, acreage or connectivity, etc.), in particular changes that would not maintain SGCN at viable levels for species populations. Update data and GIS maps; provide updated information to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.9 Identify SGCN (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources, and compile/collect and evaluate data/information regarding potential management strategies to improve the availability of such SGCN's food resources.

3.0.0.10 Conduct long-term studies to evaluate the effectiveness of management strategies implemented to enhance food/prey availability for SGCN [whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources] through studies that investigate the populations and health of the food resources as well as the target SGCN. Revise management strategies as needed and continue to monitor the effectiveness of the efforts.

3.0.0.11 Develop, implement and evaluate the effectiveness of town plans that avoid impacts to SGCN species and their habitats.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.25 Identify pathways of migratory SGCN in the Atlantic Coastal and Marine Regions (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and use the data to help evaluate the potential short- and long-term impacts of wind turbines, radio towers, utility guy lines, and other tall coastal structures on migratory populations.

3.0.0.26 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species including objectives and guidance pertaining to and the condition/status of critical and supporting habitats.

3.0.0.30 Conduct research to investigate the feasibility of managing and/or creating roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

3.0.0.31 Conduct short- and long-term studies (e.g., wildlife surveys and habitat assessments) to evaluate the effectiveness of vegetation management efforts to maintain, enhance and/or create roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.2 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.0.5 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

3.2.0.10 Evaluate the effectiveness of sanitation/decontamination protocols in minimizing the transference of wildlife diseases and invasive plant species.

3.2.0.11 Investigate the impacts of ORV use as a mechanism to spread wildlife diseases and invasive plant species to native wildlife and habitats. Integrate this information when mapping undeveloped roads and trails to identify potentially sensitive areas in northern NJ forests.

3.2.0.17 Conduct monitoring at constructed wind farms (within or outside of NJ) to assess the impacts on migratory species (birds, bats, insects) and determine if NJ's land use planning efforts and/or smart-growth plans need to be revised.

3.2.0.24 Develop, implement and evaluate the effectiveness of BMPs for lighting of/on tall structures that minimize harm to and/or disorient wildlife, in particular but not limited to migratory birds, bats and invertebrates. Implement BMPs into state, county and local permitting processes.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.2 Age, size and sex structure

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.3 Baseline inventory

3.2.3.9 Investigate hazardous environmental issues that may impact grassland invertebrates.

3.2.5 Genetics

3.2.5.1 Investigate the feasibility and potential for success of conducting genetic rescue through translocation and/or reintroduction of animals into suitable habitat that was historically occupied to increase genetic diversity and reconnect isolated populations. Methods of investigation should include, but are not limited to, thorough literature reviews, expert opinions, identifying potential pitfalls (e.g., species' fidelity to their range or critical areas), and an examination of historic and current SGCN population distribution and suitable habitat availability.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.7 Map and prioritize existing and potential areas for early succession forest management. Share the results with state, county and municipal planners.

3.3.1.8 Assess the availability and suitability of forest habitats for SGCN species (particularly reptiles and amphibians, birds, pollinators, and tiger beetles) in southern forests since Superstorm Sandy.

3.3.1.9 Inventory forests throughout northern New Jersey to develop a baseline characterization of the structure and composition of habitats and identify deficient forest habitat types.

3.3.1.18 Conduct an assessment using available data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels.

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.2 Monitoring

3.3.2.1 Evaluate the effectiveness of forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.8 Evaluate the effectiveness of current prescribed burning practices on Pinelands dependent species.

3.3.2.9 Investigate the effectiveness of various silviculture techniques for enhancing forests for forest-dependent SGCN.

3.3.2.10 Evaluate the efficacy and success of different management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.3.2.11 Evaluate and compare the effectiveness of delayed mowing of warm season grass fields versus cool season hay fields to benefit grassland-dependent species.

3.3.2.12 Evaluate and compare the effectiveness of different management techniques (e.g., prescribed burning, mowing, brush-hogging, etc.) for maintaining suitable habitat for grassland-dependent species and species dependent upon early successional habitats.

3.3.2.13 Evaluate the effectiveness of management strategies (e.g., timing restrictions for mowing, cooperative agreements with utility companies for maintenance of rights-of-ways) that maintain and enhance large existing areas of grassland in perpetuity. Focus on habitat patches that can be managed to enhance the total size of suitable grassland habitat and create interspersed early-successional habitat.

3.3.2.15 Investigate the effectiveness of management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.3.2.20 Once a system is developed for reporting and qualifying new locations of invasive species, develop, implement and monitor/evaluate invasive species removal strategies at identified locations. Priority should be given to those areas critical to SGCN and/or contain unique and/or rare plant communities supporting SGCN and/or other fish/wildlife species.

3.3.2.24 Conduct regular inventories of forests throughout northern New Jersey to characterize the changing structure and composition of habitats and monitor forest conditions.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.3 Develop/improve management techniques that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.7 Develop/improve forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

3.5.3.8 Develop best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5.3.9 Develop strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.3.19 Work with foresters to develop prescribed burning practices for Pinelands dependent species that increase or maintain habitat quality for these species in the Pinelands.

3.5.3.20 Develop guidance on various silviculture techniques for enhancing forests for forest-dependent SGCN.

3.5.3.21 Develop management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.22 Identify (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) and modify management strategies (e.g., timing restrictions for mowing, cooperative agreements with utility companies for maintenance of rights-of-ways), based on research, that maintain and enhance large existing areas of grassland in perpetuity.

3.5.3.24 Based on research, modify management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.3.29 Explore the use of alternative vegetation (i.e., commodity crops) to address agriculture concerns.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.2 Develop, implement, monitor and evaluate management strategies to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

3.5.4.10 Develop BMPs for lighting of/on tall structures that minimize harm to and/or disorientation of wildlife, in particular but not limited to migratory birds, bats and invertebrates.

3.5.4.14 Develop and implement agreements, and update existing agreements, with government agencies regarding the protection of critical SGCN habitats (e.g., significant breeding populations of beach nesting birds, colonial waterbird nesting areas, bat colonies, etc.).

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.17 Investigate new, non-invasive techniques for SGCN population evaluation through literature review, expert opinion, trial studies (if low risk), etc.

3.5.4.18 Investigate the effectiveness of survey techniques through selected “ground truthing” and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

4 Education

4.1 Educator/Instructor training

4.1.0 Public education

4.1.0.1 Provide educational resources and training programs to private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

5 Facilities and Areas

5.15 Wildlife Management Areas

5.15.6 Roads

5.15.6.1 Clearly post areas/roads where vehicle access is permitted.

5.15.6.2 Clearly post areas/trails where vehicle access is not permitted.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.1 Enhance and increase the effective size of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates by securing adjacent habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.3 Secure and protect riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.5 Secure and protect critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.7 Secure and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.8 Secure and protect scrub-shrub habitats for SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.1 Promote the protection of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates and enhance these lands by increasing the effective size through conservation area designations of stopover habitats and adjacent private lands.

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.3 Increase the protection of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through conservation area designations.

6.3.0.5 Promote the protection of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through conservation area designations.

6.3.0.7 Promote the protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through conservation area designations.

6.3.0.8 Promote the protection of scrub-shrub habitats for SGCN through conservation area designations.

6.4 Private lands agreements

6.4.0 Private land agreement strategies

6.4.0.1 Enter into private lands agreements to expand control burns on private lands, in particular those adjacent to conserved lands to improve SGCN habitats.

7 Law Enforcement

7.1 Law enforcement

7.1.4 Scale Unspecified

7.1.4.1 Improve enforcement of policies and/or regulations that promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

7.1.4.4 Improve enforcement of policies/regulations aimed at protecting and preserving critical coastal and marsh habitats, and secure mitigation for losses that create an environmental benefit.

7.1.4.5 Enforce current policies and/or regulations to increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal SGCN, and implement and enforce amended policies/regulations.

7.1.4.7 Increase law enforcement presence to enforce regulations governing recreational activities (e.g., the use of personal watercraft and off road vehicles, caving, rock climbing, etc.) on conserved lands and within other sensitive habitats, and discourage activities that cause harm or disturbance to vegetation, wetlands, fish and wildlife.

7.1.4.8 Implement policies that protect critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates.

7.1.4.10 Implement policies that promotes expanding acreages and enhances the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

7.1.4.11 Implement and enforce policies/regulations that will increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.15 Implement policies that preserve and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

7.1.4.16 Implement policies that protect and restore riparian areas.

7.1.4.17 Improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

7.1.4.19 Implement policies that protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

7.1.4.21 Implement regulations for lighting of/on tall structures that will minimize harm to and/or disorientation of wildlife, and enforce within state, county and local permitting processes.

7.1.4.22 Implement policies and/or regulations that prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

7.1.4.25 Encourage the enforcement of municipal laws regulating domestic pets that may predate on wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.4 Engage government agencies, conservation partners and other stakeholders in constructive dialogues encouraging them to influence policy change and the creation of incentives through a habitat bill and/or municipal ordinances for backyard habitat.

8.1.0.13 Engage DOD in a constructive dialogue regarding strategies to minimize disturbances to all SGCN (i.e., beyond their federal requirements) from forest management and other practices on their lands.

8.1.0.15 Engage government agencies, conservation partners and other stakeholders in discussions encouraging and supporting the creation of laws and policies requiring vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

8.1.0.16 Engage local governments in discussions regarding the importance of them adopting/passing ordinances which require assessing and addressing secondary impacts (i.e., ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

8.1.0.17 Engage municipalities in constructive dialogue to identify and minimize destruction of areas prioritized for early succession forest management.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.21 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation human-subsidized and/or overabundant, native species cause to local nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.22 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation invasive species cause to native nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.26 Coordinate across federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to woodland landowners to adopt or endorse consistent best management practices concerning controlled burns to maintain and/or improve forested habitat for wildlife.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.33 Engage government agencies, conservation partners and other land managers, communities, landowners, and commercial and industrial stakeholders in discussions regarding the importance of protecting and methods to protect priority wetlands beyond the levels afforded through regulation by maintaining and/or restoring optimal biological buffers around wetlands.

8.1.0.37 Enlist landowners and NJ citizens in the protection of and survey efforts for SGCN, in particular rare species, by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management and wildlife-related volunteer programs.

8.1.0.38 Engage partners, stakeholders and land managers in constructive dialogue promoting forest stewardship for SGCN that use core forests and forested corridors.

8.1.0.44 Engage conservation partners, stakeholders, government agencies and other land stewards in constructive dialogues encouraging their inclusion of controlled burns in forest and other stewardship plans.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.1.0.48 Form cooperative partnerships with transportation and shipment agencies and companies to facilitate habitat creation and enhancement away from and outside of project areas and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.2 Recruitment and retention activities

8.2.3 For wildlife watching

8.2.3.1 Develop and implement nature-focused tourism opportunities including wildlife viewing sites, interpretive signage highlighting unique ecosystems/habitats, and wildlife-related recreational opportunities that do not negatively impact SGCN or their habitats.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.5 Develop and provide (or otherwise make publicly available) educational programs and/or materials that provide homeowners information on how to design dwellings and other structures in a manner that is wildlife friendly (e.g., using bird-safe glass on windows).

8.3.0.6 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners, land managers and local communities to discourage the presence of managed cat colonies and trap, neuter and release programs in wildlife habitats.

8.3.0.9 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners and land managers to include only native plants in landscaping and restoration projects. Provide information to assist them in detecting problematic establishment of invasive, non-indigenous plants.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.19 Develop an educational outreach program for the public on the devastating effects predators can have on native nesting wildlife.

8.3.0.25 Develop educational outreach programs for landowners, nurseries and the general public regarding the negative impacts of invasive and non-native plants on our natural communities.

8.3.0.26 Develop educational outreach programs for private and public landowners and land managers regarding the importance of and how to manage core forests and forested corridors in a way that will be beneficial for SGCN, particularly endangered, threatened and special concern species.

8.3.0.27 Develop educational outreach programs for public and private landowners and land managers regarding the importance of structural habitat diversity, methods to increase diversity, and/or incentive programs available to increase habitat diversity.

8.3.0.28 Develop educational outreach programs for public and private landowners and land managers regarding the importance of managing grasslands for grassland-dependent species, methods of management, and/or incentive programs available.

8.3.0.30 Develop educational outreach programs for private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.5 Develop a plan that directs the creation or expansion of energy or utility rights-of-way in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.6 Develop a plan that directs the creation or expansion of roads and railroads or the re-establishment of abandoned railroads within and adjacent to critical forested habitats in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.7 Develop a plan that directs the maintenance of or new channelization of forested streams and rivers in a manner that minimizes impacts of the aquatic ecological system and adjacent forest

9.1.0.9 Develop a plan that focuses on strategies to minimize the creation of renewable energy farms (e.g., solar, wind) and related infrastructures within and their impacts on forested habitats and the wildlife community.

9.1.0.10 Develop a plan that focuses on strategies to minimize the impacts of mining on critical forested habitats.

9.1.0.11 Develop a plan that focuses on strategies to minimize the impacts of power plants on critical forested habitats and the wildlife community.

9.1.0.13 Develop a plan to minimize agriculture that would result in groundwater withdrawal in critical forested areas.

9.1.0.14 Develop a plan to minimize development that would result in groundwater withdrawal in critical forested areas.

9.1.0.15 Develop a plan to minimize fragmentation of terrestrial and aquatic habitats by roads.

9.1.0.16 Develop a plan to minimize new lawnscapes and preserve natural vegetation within and adjacent to critical forest areas.

9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

9.1.0.20 Develop a plan to minimize the impacts of existing agricultural properties adjacent to and the conversion of forest habitats (terrestrial and aquatic, within or adjacent to critical forests) to agriculture, grazing areas/livestock farms, and plantations.

9.1.0.21 Develop a plan to minimize the use of any-sized dam in critical forested areas.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.24 Develop a plan to prevent livestock from entering water bodies in critical forested habitats.

9.1.0.25 Develop a plan to prevent the conversion of forested stream buffers to pastures in critical forested habitats.

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.31 Develop wetland restoration plans that consider the life history and needs of wildlife occupying targeted habitats.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.7 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.16 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.2 Listed species recovery planning

9.3.2.1 Develop proactive species recovery plans for all endangered and threatened species including guidance and objectives pertaining to critical and supporting habitat to meet and maintain recovery goals.

9.3.3 Habitat management planning

9.3.3.5 Develop a management plan using forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

9.3.3.6 Develop a management plan for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

9.3.3.7 Develop a management plan to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

9.3.3.8 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.3.9 Develop a response plan to outbreaks using BMPs to control infestations and limit their spread in a way that avoids excessive harm to non-target species.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.3.13 Develop a management plan that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas and prevents or ameliorates near-term impacts of climate change throughout the State, but in particular within the coastal and Delaware Bay areas.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.17 Develop a management plan for prescribed burning that will benefit Pinelands dependent species and increase or maintain habitat quality for these species in the Pinelands.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.20 Develop an action plan for immediate implementation should habitat levels fall below the minimum necessary size and/or structure within the Cape May Peninsula to sustain the avian migration.

9.3.3.21 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.3.24 Develop a plan to improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

9.3.3.26 Develop a management plan for parcels of suitable size to be managed for native herbaceous plant species that support breeding grassland dependent species.

9.3.3.29 Develop habitat management plans aimed at reducing or eliminating negative impacts of ORVs.

9.3.3.32 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3.34 Include controlled burn prescriptions in forest and stewardship plans to improve wildlife habitat.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.3 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.10 Use CHANJ mapping in reviews of proposed energy, mining, transportation and utility service companies/agencies' projects to attempt to maintain habitat connectivity and reduce fragmentation, and identify potential impacts of the projects.

11.1.1.11 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed offshore energy projects relating to drilling, extraction and distribution of petroleum and gas products to reduce habitat destruction and minimize impacts on wildlife.

11.1.1.12 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed solar farm projects to reduce habitat fragmentation and minimize impacts on wildlife.

11.1.1.13 Use the best available science (species data, habitat present, wind farm layout options, wind blade impacts on migratory species, location of migration routes, etc.) when conducting regulatory reviews of proposed wind farm projects to minimize impacts on migratory and resident wildlife and reduce habitat fragmentation.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.2 Provide technical support to public and private landowners and land managers for controlling invasive, native and non-native plant species in order to increase structural habitat diversity.

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.7 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on the importance of maintaining habitat connectivity, minimizing fragmentation, and the use of CHANJ products to help them target areas for such planning.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.11 Provide educational resources, training programs, and on-the-ground guidance to private and public landowners and land managers on the benefits of and for creating young forest and early succession habitat for SGCN.

11.2.0.12 Provide educational resources and technical support to public landowners and land managers for managing grasslands for grassland-dependent species.

11.2.0.14 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters), and to enhance or restore biologically appropriate buffers.

11.2.0.16 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

11.2.0.19 Provide educational resources and technical support to public and private landowners and land managers to promote the protection and/or enhancement of scrub-shrub habitats for SGCN.

11.2.0.20 Provide educational resources and technical support to public and private landowners and land managers to promote the protection and/or enhancement of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN.

11.2.0.21 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates to promote the protection and/or enhancement of those adjacent habitats to increase the effective size of the migratory habitat.

11.2.0.22 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

11.2.0.23 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to SGCN habitats to promote the protection and/or enhancement of those adjacent habitats to increase the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and that connect conserved SGCN habitats.

11.2.0.25 Provide educational resources, training programs, and on-the-ground guidance to resource managers regarding the assessment of and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) related to residential and commercial development.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.1 Engage partners and stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.3 Provide educational resources, training programs, and on-the-ground guidance to DOD to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop and implement forest management and other practices that minimize disturbances to SGCN (i.e., beyond their federal requirements).

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

11.2.2 With private landowners

11.2.2.1 Provide technical support to farming operations and woodland landowners on ways to decrease clean farming (edge-to-edge) practices and create ecotones to benefit bobwhite and other species dependent on early successional habitat.

100 Law and Policy

100. Legislation

100.1.3 Sub-national Level

100.1.3.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.4 County and Local

100.1.4.1 Enhance critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates through the local ordinances of adjacent private lands to increase the effective size of the habitat.

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.3 Expand the acreages and enhance the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN through local ordinances.

100.1.4.4 Secure wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and biologically appropriate buffers through local ordinances.

100.1.4.5 Secure SGCN-inhabited/used freshwater wetlands and biologically appropriate buffers through local ordinances.

100.1.4.8 Secure critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through local ordinances.

100.1.4.10 Secure critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through local ordinances.

100.1.4.11 Secure riparian areas through local ordinances.

100.1.4.12 Secure scrub-shrub habitats for SGCN through local ordinances.

100.1.4.13 Encourage municipal laws regulating domestic pets that may predate on wildlife.

100.1.4.14 Adopt/pass local ordinances which require assessing and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.5.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100.1.5.5 Develop legislation to provide financial support for the New Jersey Invasive Species Strike Team.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.3 Develop policies that will promote the long term protection of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates.

100.3.0.5 Develop policies that will promote improved and secure habitat connections between conserved SGCN habitats.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.7 Amend current policies and/or regulations to increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.12 Develop policies that promote the preservation and protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.14 Develop policies and/or regulations that increase the protective buffers of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) to biologically appropriate distances to benefit SGCN that rely upon these habitats and improve the function of the [associated] aquatic systems.

100.3.0.15 Develop policies that promote protecting and restoring scrub-shrub habitats to benefit shrub-dependent SGCN.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.19 Develop regulations for lighting of/on tall structures that will minimize harm to and/or disorientation of wildlife, in particular but not limited to migratory birds, bats and invertebrates. Implement BMPs into state, county and local permitting processes.

100.3.0.20 Develop policies and/or regulations that prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

100.3.0.23 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.24 Create legislation to establish markets for warm-season grasses to increase the permanency of this crop on the landscape.

100.3.0.31 Create or expand tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMPs.

100.3.0.32 Coordinate regulations across agencies to maximize availability of and enrollment in existing Forestry Stewardship Programs (e.g., "Woodland Stewards", Farm Bill, partners, etc.) to maintain and/or improve forest habitat.

100.3.0.40 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.

100.3.0.42 Fully adopt the former Storm water Management Rules' 300ft buffer requirements into the Flood Hazard Area Control Act Rules.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.45 Increase the controlled burn season to focus on restoring vegetative communities.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.48 Propose new State law or regulation mandating that a State-level "development impact fee" be assessed on all new development approved by municipalities (via the Municipal Land Use Law processes), and dedicate such monies to the development and implementation of regional Habitat Conservation Plans (or existing plans/programs serving the same regional function).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.53 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded rights-of-way corridors associated with energy transport/transmission.

100.3.0.54 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded surface mining areas.

100.3.0.56 Develop regulations that when implemented will protect critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates.

100.3.0.57 Develop regulations that when implemented will improve and secure habitat connections between conserved SGCN habitats.

100.3.0.58 Develop regulations that when implemented will promote the expansion of acreages and enhancement of the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.59 Develop regulations that when implemented will increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.63 Develop regulations that when implemented will preserve and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.64 Develop regulations that when implemented will protect and restore riparian areas.

100.3.0.65 Develop regulations that when implemented will protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

100.3.0.67 Develop regulations for lighting of/on tall structures that will minimize harm to and/or disorientation of wildlife, and enforce within state, county and local permitting processes.

100.3.0.68 Develop regulations that when implemented will prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

100.3.0.70 Develop regulations that when implemented will facilitate the restoration of dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100.3.0.73 Develop regulations that would exempt the conversion of lawns to native vegetation (beneficial to wildlife) from local lawn ordinances.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.3 Develop policies for mandatory buffer strips on preserved farmlands and state-owned agricultural lands.

100.4.0.4 Create a policy that requires the use of wildlife habitat and corridor mapping products for both regulatory use when conducting project reviews and planning/siting new or expanded rights-of-way projects.

100.4.0.8 Develop a white paper addressing the impacts that existing, new or expanded rights-of-way have upon wildlife, wildlife habitats and habitat connectivity.

100.4.0.9 Develop and implement policies to minimize the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats in order to benefit wildlife.

100.4.0.12 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.4.0.13 Develop policies for different circumstances (e.g., roadsides and medians, riparian, aquatic and terrestrial habitats) that outline appropriate habitat/vegetation management strategies and schedules to minimize risks to and benefit wildlife.

100.4.0.14 Develop policies to facilitate agreements between eligible entities to manage appropriate conserved lands for grassland-dependent species, and to have access to/obtain restoration funds.

100.4.0.16 Develop policies to implement habitat management strategies that will increase the structural diversity surrounding areas used for energy, mining, and transportation and service corridors which include but are not limited to the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-

100.4.0.17 Develop policies to implement habitat management strategies, including prescribed burns, that will increase the structural diversity on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies to control and reduce the impacts of invasive, non-native species in order to increase structural habitat diversity.

100.4.0.18 Develop policies to minimize the extent of infrastructure associated with energy and service corridors or areas (e.g., wind and solar farms, pipelines, utility lines) and that require the implementation of habitat management strategies that will increase the structural diversity in the area including (e.g., the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides).

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.24 Develop policies to provide financial support for the New Jersey Invasive Species Strike Team.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Reptiles & Amphibians

Bog Turtle

Focal species that comprise this Conservation Target:

Bog Turtle

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:

1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.1.1.2 Loss, alteration and/or degradation of habitat.

1.1.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.

1.1.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.

1.1.1.5 Impervious surfaces can lead to a decrease in water recharge.

1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.1.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:

1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.2.1.2 Loss, alteration and/or degradation of habitat.

1.2.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.

1.2.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.

1.2.1.5 Impervious surfaces can lead to a decrease in water recharge.

1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.2.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats:

1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.3.1.2 Loss, alteration and/or degradation of habitat.

1.3.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.

1.3.1.4 Impervious surfaces can lead to a decrease in water recharge.

1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.3.1.6 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture (Avg. Score: 2.00)

NJ Specific Threats: 2.1.1.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.1.3 Conversion of agricultural landscape that results in increased erosion, runoff, and chemical and thermal pollution decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.1.2 Small-holder Farming (Avg. Score: 2.00)

NJ Specific Threats: 2.1.2.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.2.2 Fragments terrestrial and aquatic habitats.

2.1.2.3 Agricultural practices (e.g., mechanized, row-crop agriculture) can render lands unsuitable for most wildlife due to soil degradation and erosion.

2.1.2.4 Agricultural practices (e.g., mechanized, row-crop agriculture) can cause direct mortality to wildlife when harvesting takes places.

2.1.3 Agro-industry (Avg. Score: 2.00)

NJ Specific Threats: 2.1.3.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.3.2 Fragments terrestrial and aquatic habitats.

2.1.3.3 Agricultural practices (e.g., mechanized, row-crop agriculture) can render lands unsuitable for most wildlife due to soil degradation and erosion.

2.1.3.5 Loss of ecotones by implementing clean farming (edge-to-edge) practices degrades habitat for early successional wildlife.

2.2 Wood and Pulp Plantations

2.2.1 Small Holder (Avg. Score: 1.00)

NJ Specific Threats: 2.2.1.2 Tree harvesting can cause direct mortality to wildlife, especially if done during peak activity periods or vulnerable life stages (e.g., denning, nesting, gestation/birthing, basking, roosting, pre-volancy, etc.).

2.2.2 Agro-industry Plantations (Avg. Score: 1.00)

NJ Specific Threats: 2.2.2.2 Tree harvesting can cause direct mortality to wildlife, especially if done during peak activity periods or vulnerable life stages (e.g., denning, nesting, gestation/birthing, basking, roosting, pre-volancy, etc.).

2.3 Livestock Farming and Ranching

2.3.2 Small-holder Grazing (Avg. Score: 2.00)

NJ Specific Threats: 2.3.2.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

2.3.2.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.2.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

2.3.3 Agro-industry Grazing (Avg. Score: 2.00)

NJ Specific Threats: 2.3.3.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

2.3.3.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.3.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

3 Energy Production and Mining

3.1 Oil and Gas Facilities and Pipelines

3.1.1 Distribution processes of petroleum and other liquid hydrocarbons (Avg. Score: 2.00)

NJ Specific Threats: 3.1.1.1 Fragments terrestrial and aquatic habitats.

3.1.1.2 Loss, alteration and/or degradation of habitat.

3.1.1.3 Increased risk of oil spills.

3.1.1.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.

3.1.2 Natural gas distribution processes (Avg. Score: 2.00)

NJ Specific Threats: 3.1.2.1 Fragments terrestrial and aquatic habitats.

3.1.2.2 Loss, alteration and/or degradation of habitat.

3.1.2.3 Increased risk of gas leaks and explosions.

3.1.2.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.

3.2 Mining and Quarrying

3.2.2 Surface Mining - Rock Quarry (and sand quarries) (Avg. Score: 2.00)

NJ Specific Threats: 3.2.2.1 Fragments terrestrial and aquatic habitats.

3.2.2.2 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

3.2.2.3 Increased risk of vehicle strikes/mortality to wildlife.

3.3 Renewable Energy

3.3.1 Wind Power (Avg. Score: 1.00)

NJ Specific Threats: 3.3.1.2 Fragments terrestrial habitats.

3.3.1.3 Loss, alteration and/or degradation of habitat.

3.3.1.4 Increased commercial infrastructure.

3.3.2 Solar Power (Avg. Score: 2.00)

NJ Specific Threats: 3.3.2.1 Fragments terrestrial habitats.

3.3.2.2 Loss, alteration and/or degradation of habitat.

3.3.2.3 Increased commercial infrastructure.

3.4 Conventional Power Plants

3.4.0 Conventional Power Plants (Avg. Score: 2.00)

NJ Specific Threats: 3.4.0.2 Loss, alteration and/or degradation of habitat due to new or the expansion of current facilities.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats: 4.1.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species and inhibiting dispersal of non-volant animals, reducing gene flow.

4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.1.1.5 Re-establishment of abandoned railroad lines may decrease turtles' abilities to disperse due to their difficulty traversing the railroad ties and tracks, leading to decreased genetic exchange.

4.1.2 Movement of cars and other vehicles on roads and railroads (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats: 4.1.2.1 Increased vehicle traffic increases the risk of wildlife mortality from strikes.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads (Avg. Score: 2.00)

NJ Specific Threats: 4.2.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species, inhibiting dispersal of non-volant animals, reducing gene flow, and creating barriers to fish when service line-associated roads cross streams (e.g., bridges, culverts, fords, etc.).

4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

4.2.1.4 Lines that cross or run parallel to streams result in a loss or reduction of vegetated riparian buffers and streamside shading, affecting water quality and in-stream habitat for aquatic biota.

4.2.2 Management of rights-of-way or communication tower facilities and/or their associated access roads (Avg. Score: 2.00)

NJ Specific Threats: 4.2.2.1 Improper or poorly scheduled vegetation management can cause direct mortality to and may reduce productivity of wildlife.

5 Biological Resource Use

5.1 Hunting and Collecting Terrestrial Animals

5.1.1 Intentional Use (Avg. Score: 3.00)

NJ Specific Threats: 5.1.1.1 Illegal collection of wildlife can have detrimental impacts on populations.

5.1.2 Unintentional effects (Avg. Score: 1.00)

NJ Specific Threats: 5.1.2.2 Disruption of normal wildlife behavior.

5.2 Gathering Terrestrial Plants

5.2.2 Unintentional effects (Avg. Score: 1.00)

NJ Specific Threats: 5.2.2.1 Stepping on nests or young/hatchling animals.

5.2.3 Control (Avg. Score: 1.00)

NJ Specific Threats: 5.2.3.2 Clearing of scrub-shrub vegetation [and snags] diminishes cover and nesting habitat.

5.2.3.3 Removal of riparian or near-stream vegetation alters water quality and in-stream habitat for aquatic organisms by reducing streamside shading, increasing bank erosion, and affecting the natural filtering ability of trees, shrubs, and grasses.

5.3 Logging and Wood Harvesting

5.3.1 Intentional Use (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats:

5.3.1.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.1.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.1.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.1.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.1.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.2 Intentional Use (large scale) (Avg. Score: 2.00)

NJ Specific Threats:

5.3.2.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.2.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.2.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.2.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.2.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.3 Unintentional effects (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats:

5.3.3.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.3.2 Poorly planned/implemented tree harvesting adjacent to waterways and vernal pools can lead to increased water temperatures, soil erosion and sedimentation, and reduces the potential for woody debris within the aquatic system, leading to negative impacts on wildlife.

5.3.4 Unintentional effects (large scale) (Avg. Score: 2.00)

NJ Specific Threats:

5.3.4.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4.2 Extensive infrastructure and larger equipment requirements present a potential risk of direct injury/mortality to wildlife.

5.3.4.3 Poorly planned/implemented tree harvesting adjacent to waterways and vernal pools can lead to increased water temperatures, soil erosion and sedimentation, and reduces the potential for woody debris within the aquatic system, leading to negative impacts on wildlife.

5.3.4.4 Infrastructure and/or equipment use may result in subtle changes to drainage patterns, adversely affecting vernal pool and wetland hydrology.

5.3.4.5 Lack of appropriate, sustainable forest management can lead to a decrease in forest habitat diversity, degraded habitat for many forest species, the loss of habitat for early-successional species, and/or the loss of unique habitats for species that need canopy breaks and multi-aged tree composition to fulfill various life history requirements.

5.4 Fishing and Harvesting of Aquatic Resources

5.4.1 Intentional Use (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.4.1.4 Illegal collection of aquatic and semi-aquatic wildlife can have detrimental impacts on populations.

5.4.2 Intentional Use (large scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.4.2.4 Illegal collection of aquatic and semi-aquatic wildlife can have detrimental impacts on populations.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized) (Avg. Score: 1.00)

NJ Specific Threats: 6.1.1.1 Inappropriate use of off-road vehicles creates new roads/trails which fragments habitat.

6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.

6.1.1.3 Increased risk of harassment that results in a change in wildlife behavior and/or direct mortality from vehicle strikes.

6.1.1.6 Off-road vehicles can be a mechanism of transference of wildlife diseases and invasive plant species if gear and apparel are not properly sanitized between sites.

6.1.5 Wildlife observation and photography (Avg. Score: 1.00)

NJ Specific Threats: 6.1.5.1 Improperly conducted recreational activities may disrupt normal wildlife behaviors which can result in reduced reproductive success or survival, abandonment of critical sites, etc.

6.1.5.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3 Work and Other Activities

6.3.1 Unauthorized research projects at significant habitats (Avg. Score: 2.00)

NJ Specific Threats: 6.3.1.1 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.1.2 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.2 Authorized research projects at significant habitats (Avg. Score: 2.00)

NJ Specific Threats: 6.3.2.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.2.3 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.3 Other "work" unrelated to research (Avg. Score: 2.00)

NJ Specific Threats: 6.3.3.1 Construction projects may disrupt normal wildlife behavior which can result in reduced reproductive success or survival, abandonment of critical sites, etc. (e.g., bridge-nesting birds).

6.3.3.4 Workers may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

7 Natural Systems Modifications

7.1 Fire and Fire Suppression

7.1.1 Increase in Fire Frequency/Intensity (Avg. Score: 2.00)

NJ Specific Threats:

7.1.1.1 Increase in frequency and intensity of wild fires as a result of droughts and heat waves drying out vegetation and litter.

7.1.1.2 Increase in frequency of wild fires as a result of illegal activities.

7.1.1.3 Unnatural fire regimes occurring as a result of military exercises.

7.1.2 Suppression of Fire Frequency/Intensity (Avg. Score: 2.00)

NJ Specific Threats:

7.1.2.1 Shift in vegetative communities as a result of suppression of natural fires.

7.1.2.2 Lack of diversity in age structure and composition of vegetation due to the suppression of fire.

7.2 Dams and Water Management/Use

7.2.1 Abstraction of Surface Water (domestic use) (Avg. Score: 3.00)

NJ Specific Threats:

7.2.1.1 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.1.2 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.1.3 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, and eliminates shallow water habitats.

7.2.2 Abstraction of Surface Water (commercial use) (Avg. Score: 3.00)

NJ Specific Threats:

7.2.2.1 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, eliminates shallow water habitats, and disrupts/removes stream bottom habitat.

7.2.2.2 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.2.3 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.3 Abstraction of Surface Water (agricultural use) (Avg. Score: 3.00)

NJ Specific Threats:

7.2.3.1 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.3.2 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, and eliminates shallow water habitats.

7.2.3.5 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.5 Abstraction of Ground Water (domestic use) (Avg. Score: 3.00)

NJ Specific Threats:

7.2.5.1 Heavy withdrawal of ground water for domestic use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.6 Abstraction of Ground Water (commercial use) (Avg. Score: 3.00)

NJ Specific Threats: 7.2.6.1 Heavy withdrawal of ground water for industrial and commercial use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.7 Abstraction of Ground Water (agricultural use) (Avg. Score: 3.00)

NJ Specific Threats: 7.2.7.1 Heavy withdrawal of ground water for agricultural use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.9 Small Dams (Avg. Score: 3.00)

NJ Specific Threats: 7.2.9.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.9.3 Dams act as a barrier to movement, limiting the ability of aquatic or semi-aquatic wildlife to move safely between habitats.

7.2.10 Large Dams (Avg. Score: 3.00)

NJ Specific Threats: 7.2.10.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.10.3 Dams act as a barrier to movement, limiting the ability of aquatic or semi-aquatic wildlife to move safely between habitats.

7.2.11 Dams (size unknown) (Avg. Score: 3.00)

NJ Specific Threats: 7.2.11.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.11.3 Dams act as a barrier to movement, limiting the ability of aquatic or semi-aquatic wildlife to move safely between habitats.

7.2.12 Culverts (Avg. Score: 2.00)

NJ Specific Threats: 7.2.12.1 Improper design, placement, installation and maintenance of culverts and other stream crossing structures can impede or prevent the movements of terrestrial organisms and can restrict or limit stream flow, impeding the movement of aquatic organisms along riparian corridors.

7.2.13 Stream Burial (Avg. Score: 2.00)

NJ Specific Threats: 7.2.13.1 Eliminates riparian habitats.

7.2.13.2 Eliminates in-stream habitat and water resources for wildlife.

7.2.13.3 Alters the hydrology and quality of downstream aquatic and riparian habitats.

7.3 Other Ecosystem Modifications

7.3.2 Inappropriate timing of mowing (Avg. Score: 2.00)

NJ Specific Threats: 7.3.2.1 Increased risk of direct mortality and/or reduced productivity of wildlife, as well as reduced use by migrating species.

7.3.3 Removal of coarse woody debris (streams, forests, scrub-shrub habitats) (Avg. Score: 1.00)

NJ Specific Threats: 7.3.3.2 Decreases habitat and/or corridor suitability due to limited or absent shelter and foraging habitat.

7.3.3.3 Removal of dead trees (snags), large felled logs (i.e., those > 12" dbh), and other downed woody material diminishes nesting, roosting, and sheltering options for wildlife, and increases the ease at which deer can browse regenerating vegetation.

7.3.4 Lack of natural disturbance patterns or ecosystem functions due to species loss (Avg. Score: 1.00)

NJ Specific Threats: 7.3.4.3 The extinction of prehistoric herd grazers and the more recent decline of the state's dairy industry has reduced the low-impact maintenance of early successional habitat relied upon by wildlife.

7.3.5 Poor habitat management (Avg. Score: 2.00)

NJ Specific Threats:

7.3.5.1 Improper or poorly scheduled maintenance of man-made corridors (e.g., roadsides and medians) can cause direct mortality to and may reduce productivity of wildlife.

7.3.5.2 Shifting from natural vegetation to lawns can cause increased temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

7.3.5.3 Vegetation clearing removes terrestrial and riparian corridors for animal movement, shelter, and resting areas.

7.3.5.4 Vegetation clearing or inappropriate alteration adjacent to aquatic habitats threatens aquatic species by degrading habitat and water quality (altering temperature and dissolved oxygen, increasing siltation and desiccation, etc.).

7.3.5.5 Habitat management that alters or removes vegetation without implementing long-term management increases the risk of invasive and exotic plants establishing themselves, outcompeting native vegetation.

7.3.5.6 Habitat management, including that which occurs on public and private lands, that does not consider timing and species' behaviors can result in the direct mortality and/or alteration or loss of habitat.

7.3.5.7 Improperly planned habitat management and/or mitigation efforts along roadsides and within the medians can attract wildlife and increase the risk of vehicle strikes.

7.3.5.10 Ditching, draining and filling of marshes and wetlands eliminates habitat and degrades the remaining surrounding areas for wildlife.

7.3.5.12 Lack of diversity in age structure and composition of vegetation due to lack of natural disturbances and/or vegetation management.

7.3.5.13 Private landowners with rare species on their properties are not always cooperative in the protection and management of the species' habitats. Landowners may be held accountable for their actions when they cause harm to the species or destroy the habitat, but it is often too late for the species' population.

7.3.5.14 Intentional felling and removal of dead standing trees or snags eliminates resting, nesting or feeding habitat, and precludes the snags eventual contribution to coarse woody debris and forest floor structure and habitat.

7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species (Avg. Score: 2.00)

NJ Specific Threats:

8.1.1.1 Displace or outcompete native species for resources.

8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.

8.1.1.3 Invasive, non-native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

8.1.1.4 Invasive, non-native animals increase the risk of predation on native animals and/or herbivory on native vegetation.

8.1.1.5 Invasive, non-native animals and plants increase the risk of introduction and transference of diseases

8.1.1.6 Invasive, non-native plants may create physical barriers for some species.

8.1.2 Invasive non-native aquatic animals (Avg. Score: 2.00)

NJ Specific Threats: 8.1.2.2 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminishing habitat suitability and reducing ecological integrity of natural communities, and may introduce disease into a population.

8.1.3 Invasive non-native aquatic plants (Avg. Score: 2.00)

NJ Specific Threats: 8.1.3.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.4 Invasive non-native terrestrial/wetland animals (Avg. Score: 1.00)

NJ Specific Threats: 8.1.4.1 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.4.2 Free-roaming and feral domestic animals such as cats and dogs causes direct mortality of wildlife and disturbance to wildlife breeding and resting areas.

8.1.5 Invasive non-native terrestrial/wetland plants (Avg. Score: 2.00)

NJ Specific Threats: 8.1.5.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.6 Invasive non-native fungal/bacterial diseases (Avg. Score: 2.00)

NJ Specific Threats: 8.1.6.1 The introduction of non-native fungal and bacterial diseases threatens native populations and ecosystems.

8.2 Problematic Native Species/Diseases

8.2.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.2.1.1 Overabundant native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

8.2.1.2 Invasive pathogens and insects may increase in range and abundance as limiting factors (such as temperature) are altered as a result of climate change.

8.2.1.3 Invasive, native species can out-compete non-invasive species for resources (food, light, shelter), leading to the demise of some species populations.

8.2.1.4 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.2.2 Named Species (Avg. Score: 1.00)

NJ Specific Threats: 8.2.2.2 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.4 Problematic Species/Diseases of Unknown Origin

8.4.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.4.1.1 Non-native or poorly understood diseases and parasites could potentially impact native animals.

8.4.2 Named Species (Avg. Score: 1.00)

NJ Specific Threats: 8.4.2.2 Diseases of unknown origin, such as snake fungal disease and Ranavirus, can cause significant mortality among native animal populations.

8.5 Viral/Prion-induced Diseases

8.5.1 Unspecified Species (Disease) (Avg. Score: 1.00)

NJ Specific Threats: 8.5.1.1 There is a large knowledge gap regarding the existence of, or potential for, other diseases impacting native wildlife.

8.5.2 Named Species (Disease) (Avg. Score: 1.00)

NJ Specific Threats: 8.5.2.1 Diseases such as West Nile Virus, arenavirus, sudden oak death, Avian Influenza, and snake fungal disease cause morbidity or mortality to native populations.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.1 Domestic and Urban Waste Water

9.1.1 Sewage (Avg. Score: 2.00)

NJ Specific Threats: 9.1.1.1 Degradation of aquatic and marine water quality and habitats by changing turbidity, flow and water chemistry.

9.1.1.2 Leads to increased eutrophication and algae blooms that result in oxygen depletion.

9.1.1.3 Contaminants in sewage treatment effluents and Combined Sewer Overflows can cause developmental and behavioral abnormalities and reproductive failure in wildlife.

9.1.2 Run-off (Avg. Score: 2.00)

NJ Specific Threats: 9.1.2.1 Chemical fertilizers and nutrient run-off changes the pH in streams and ponds and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.1.2.2 Contaminants degrade aquatic and marine water quality and can bioaccumulate in benthic organisms, threatening wildlife by causing developmental and behavioral abnormalities and reproductive failure.

9.1.2.3 Contaminants from road runoff (oil, sediment, salt, etc.) impact native vegetation and the species that rely upon them, degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2 Industrial and Military Effluents

9.2.1 Oil Spills (Avg. Score: 2.00)

NJ Specific Threats: 9.2.1.1 Oil spills render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.1.2 Oil spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.1.3 Oil spills cause external oiling of wildlife and ingestion of oil, both of which can injure or kill wildlife.

9.2.2 Seepage from Mining (Avg. Score: 2.00)

NJ Specific Threats: 9.2.2.1 Contaminants from mining degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2.3 Other (Avg. Score: 2.00)

NJ Specific Threats: 9.2.3.1 Point and nonpoint source pollution such as polychlorinated biphenyls (PCBs), pesticides, heavy metals, and endocrine disrupting compounds (EDC's) into freshwater and marine systems pose threats to wildlife through direct contact and/or ingestion, and to aquatic species and their predators through bioaccumulation, impacting the reproductive success and neurological function of many avian and fish species.

9.2.3.2 Chemical spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.3.3 Chemical spills may render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.4 Other: Hydrofracturing (Avg. Score: 1.00)

NJ Specific Threats:

9.2.4.1 Contaminants from hydrofracturing degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2.4.2 Uncontrolled effluents escaping from hydrofracturing facilities can cause injury to wildlife and alter normal behaviors.

9.2.5 Other: Industrial toxic settling ponds (Avg. Score: 1.00)

NJ Specific Threats:

9.2.5.1 Surficial or open industrial effluent ponds can cause injury or death to wildlife that become exposed through ingestion or submersion.

9.3 Agricultural and Forestry Effluents

9.3.1 Nutrient Loads (Avg. Score: 2.00)

NJ Specific Threats:

9.3.1.1 Chemical fertilizers and nutrient run-off changes the pH in streams, ponds and wetlands and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.3.1.2 Animal waste degrades terrestrial and aquatic habitats, especially streams, ponds and wetlands, resulting in eutrophication, which disrupts oxygen and nutrient balances, and causes injury and mortality to aquatic organisms.

9.3.1.4 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades wetland and aquatic habitats with runoff, increasing sediment and nutrient loads and pH.

9.3.1.5 Conversion of native forests to plantations degrades wetland and aquatic habitats through increased runoff.

9.3.2 Soil Erosion and Sedimentation (Avg. Score: 2.00)

NJ Specific Threats:

9.3.2.1 Soil erosion, sedimentation and destruction of streambanks and riparian buffers degrade waters making them unsuitable for riparian-dependent wildlife.

9.3.2.3 Conversion of native forests to plantations degrades wetland and aquatic habitats through increased sedimentation.

9.3.3 Herbicides and Pesticides (Avg. Score: 2.00)

NJ Specific Threats:

9.3.3.1 Pesticides degrade terrestrial and aquatic habitats, especially streams, ponds and wetlands. Aquatic wildlife are particularly sensitive to these contaminants, which can cause developmental and behavioral abnormalities and reproductive failure. Some contaminants may bioaccumulate in predatory fish and birds and disrupt reproduction.

9.3.3.3 Use of pesticides can directly harm non-target species through direct contact and/or by reducing and/or contaminating their food supply.

9.3.4 Other (Avg. Score: 2.00)

NJ Specific Threats:

9.3.4.1 Spills, leaks or discharges of fuel, oil or other contaminant fluids from machinery or equipment used in the normal course of agricultural or forestry activities can degrade or destroy adjacent aquatic and terrestrial habitats and/or cause harm to non-target species (plants and animals).

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture (Avg. Score: 2.00)

NJ Specific Threats: 9.3.5.4 Improper use of current insecticides, such as those containing esfenvalerate, prallethrin, or piperonyl butoxide, or past use of pesticides containing chlordane still present in the soils, are toxic to various wildlife species, and can cause injury, mortality, or other effects that impair population viability.

9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.4 Garbage and Solid Waste

9.4.1 Direct hazards to wildlife (Avg. Score: 1.00)

NJ Specific Threats: 9.4.1.2 Garbage and solid waste destroys natural habitats and obstructs wildlife movements.

9.5 Air-Bourne Pollutants

9.5.1 Acid Rain (Avg. Score: 1.00)

NJ Specific Threats: 9.5.1.1 Causes acidification of water bodies, resulting in changes to aquatic and marine communities and reducing biodiversity, and creating conditions that are unsuitable for some aquatic (freshwater and marine) and semi-aquatic species that are sensitive to pH shifts.

9.5.1.2 Leaches calcium from the soils which in turn reduces the availability of prey, particularly calcium-rich prey such as snails.

9.5.4 Other (Avg. Score: 1.00)

NJ Specific Threats: 9.5.4.1 Dust and/or airborne sedimentation from construction sites, agricultural operations or related earth disturbances can introduce mineral or organic sediments into adjacent wildlife habitats, degrading their quality and suitability for wildlife short-term and/or long-term.

9.5.6 Herbicides and Pesticides (Avg. Score: 2.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

9.6 Excess Energy

9.6.2 Thermal Pollution (Avg. Score: 1.00)

NJ Specific Threats: 9.6.2.2 Water temperature changes to aquatic systems can deter or preclude use by SGCN (e.g., alter habitat suitability for wildlife species, reduce prey base) or present stressors that are harmful if not fatal to wildlife.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 1.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.2 Droughts

11.2.1 Droughts (Avg. Score: 2.00)

NJ Specific Threats: 11.2.1.1 Contribute to hardened soils, decreasing water recharge during rains and increasing the likelihood of flash floods during storms.

11.2.1.2 Lead to lower groundwater levels and therefore, less available water for people and habitats.

11.2.1.3 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

11.3 Temperature Extremes

11.3.1 Temperature extremes (Avg. Score: 2.00)

NJ Specific Threats: 11.3.1.1 Increasing temperatures may cause habitat loss and degradation by desiccating and/or raising the temperatures of small wetlands and streams leading to the loss of freshwater mussels and other aquatic species and species reliant upon these habitats.

11.3.1.2 Increased temperatures can negatively impact wetland, riverine, lacustrine and vernal pool-associated or -dependent wildlife by reducing flows, increasing water temperatures, lowering water levels and causing premature drying of vernal habitats.

11.3.1.4 Extremely low temperatures and/or extensive periods of unseasonably low temperatures during critical life history stages (e.g., hibernation, gestation/nesting) can alter animals' behaviors and decrease survivorship.

11.4 Storms and Flooding

11.4.1 Storms and flooding (Avg. Score: 1.00)

NJ Specific Threats:

11.4.1.1 Extreme storms and flooding events threaten aquatic and marine wildlife through habitat degradation and alteration, including alterations to off-shore or back-bay benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic and marine wildlife.

11.4.1.3 Increase risk of saltwater intrusion to freshwater habitats altering the water chemistry and potentially altering aquatic wildlife community.

11.4.1.4 Flood events alter river or stream morphology, benthic conditions and habitat availability for wildlife, cause bank erosion, and deposit sediments in floodplain wetlands altering wildlife habitat.

11.4.2 Increased rainfall (Avg. Score: 1.00)

NJ Specific Threats:

11.4.2.1 Extreme rain events threaten aquatic wildlife through habitat degradation and alteration, including alterations to benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic wildlife.

11.4.2.2 Extreme rain events can damage wildlife nesting and resting habitats, including impacts to avian eggs and chick and small mammal survivorship.

11.4.2.3 More frequent rain events can alter terrestrial and wetland vegetation communities as well as wetland hydrology, shifting wildlife community use.

11.6 Phenology Shifting or Alteration

11.6.2 Phenology shifts related to predator-prey ecology (Avg. Score: 1.00)

NJ Specific Threats:

11.6.2.1 Alters inter-specific relationships (e.g., competition, parasitism, predation) of wildlife, ultimately leads to detrimental impacts on the ecological system.

11.6.2.2 Shifts timing of species migration, breeding and hibernation, and available food resources, causes redistribution of species, or mortality for species that are unable to relocate due to their already isolated habitat or limited mobility.

11.6.3 Phenology shifts related to species redistribution (Avg. Score: 1.00)

NJ Specific Threats:

11.6.3.1 Shifts in timing of species migration, breeding and hibernation, and available food resources, as a result of wildlife range shifts driven by climate change.

11.6.3.2 Shifts in nesting times or egg incubation durations can limit nest success and longterm populations.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 2.00)

NJ Specific Threats:

12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.2 Lack of up-to-date existing information (Avg. Score: 2.00)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.3 Need to answer research question (Avg. Score: 2.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.4 Need to develop new technique (Avg. Score: 1.00)

NJ Specific Threats: 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 1.00)

NJ Specific Threats: 12.3.0.6 Certain geographic or habitat features, such as vernal pools and headwater wetlands or streams, may be too small, mischaracterized, or misidentified to benefit from regulatory protection.

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 1.00)

NJ Specific Threats: 12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 2.00)

NJ Specific Threats: 14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 2.00)

NJ Specific Threats: 14.2.1.1 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various forest management practices.

14.2.1.2 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various aquatic and riparian management practices.

14.2.1.5 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various wetland management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 1.00)

NJ Specific Threats: 15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.6 Secure and promote the protection/restoration of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers through incentive programs.

1.2.1.7 Secure and promote the protection/restoration of fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.12 Create incentives (non-monetary and/or monetary) for land developers to redevelop abandoned areas (e.g., shopping centers, office complexes) to minimize the loss of natural habitats and reduce the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.17 Develop a public-relations oriented certification program for private retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.18 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and land managers to control and reduce the impacts of invasive, native and non-native species in order to increase structural habitat diversity.

1.2.1.20 Coordinate across government agencies and non-government organizations to create or expand upon tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMP's.

1.2.1.22 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to horse/livestock farm owners and managers to increase structural habitat diversity in and around the farms by managing vegetation for a variety of species, in particular, farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

1.2.1.23 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to provide cost shares and/or plan approvals for management based on management approaches and prescriptions.

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

1.2.1.28 Create incentives to implement dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

2 Direct Management of Natural Resources

2.2 Dam and barrier removal

2.2.1 Culvert work

2.2.1.1 Replace existing barriers to wildlife movement with and/or install appropriately-sized systems to accommodate wildlife dispersal.

2.3 Fire management

2.3.3 Prescribed burning

2.3.3.1 Evaluate different management techniques of prescribed burns that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

2.3.3.3 Conduct prescribed burning to improve wildlife habitat.

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.5 Implement biologically safe and appropriate control/management strategies, and where appropriate, eradication strategies to reduce the impacts and/or limit the distribution of invasive and/or non-native plant species within or near aquatic systems using methods that will provide the most protection to the aquatic and riparian ecological system, and minimize disturbance to the soil and wildlife. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.8.0.6 Implement long-term management of invasive and/or non-native plants to help maintain functioning ecological systems and biological diversity, and to enhance travel corridors. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.4 Restore and/or enhance suitable travel corridors connecting conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.8 Protect significant natural and/or unique communities by implementing best management practices when conducting habitat restoration strategies.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.15 Restore and/or enhance terrestrial and aquatic habitats proximate to but not adjacent to roads and other transportation corridors for terrestrial-bound SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.10.0.24 Use NJ's CHANJ mapping and guidance to establish vegetation and enhance or create corridors between fragmented habitats with similar vegetation, slope, soils, structure, etc. to ensure vegetative integrity is maintained to allow wildlife to safely disperse, and corridors are buffered with natural habitats to minimize disturbance to wildlife within the corridors.

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.11.0.3 Create suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats through vegetation management.

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through vegetation management.

2.11.0.6 Reclaim degraded rare species habitats by conducting vegetation management needed to restore habitat value for the documented/target SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.8 Maintain, enhance and/or restore biologically appropriate buffers for SGCN-inhabited/used freshwater wetlands through vegetation management.

2.11.0.13 Implement best management practices (BMPs), protective strategies, and guidelines for vegetation management to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.11.0.14 Conduct vegetation management adjacent to roads for SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.11.0.16 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.11.0.21 Minimize the degradation, alteration and/or changes in hydrology of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and subsequent disturbances to and behavioral changes of wildlife by maintaining or enhancing these areas and biologically appropriate buffers through habitat management and/or revegetation or restoration efforts.

2.11.0.23 Implement appropriate habitat management actions in areas where natural disturbances, such as wildfire, have been precluded.

2.11.0.26 Conduct vegetation management along roadsides and medians, avoiding peak activity periods for wildlife, that enhances wildlife dispersal naturally and safely across roads and similar barriers to/between terrestrial and/or aquatic habitats.

2.11.0.31 In areas where vegetative communities are shifting due to fire suppression and controlled burns are not feasible, manage vegetation to improve wildlife habitat.

2.11.0.32 Increase structural habitat diversity around and when feasible, within agricultural landscapes by managing vegetation for a variety of species, in particular, those farms that have removed scrub-shrub habitat and/or fragmented forests, and by implementing ecologically best practices (e.g., no-till farming, maintaining hedgerows, buffer set-asides, etc.).

2.11.0.33 Increase structural habitat diversity by implementing long-term vegetation management to minimize the potential for the establishment of invasive and/or non-native plants that may outcompete native vegetation.

2.11.0.35 Increase structural habitat diversity by managing vegetation adjacent to aquatic habitats in a manner that provides a buffer from runoff and erosion and a microclimate to stabilize seasonal temperatures to benefit a variety of aquatic and semi-aquatic species.

2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.

2.11.0.37 Increase structural habitat diversity by minimizing the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats which benefits wildlife.

2.11.0.38 Increase structural habitat diversity in and around horse/livestock farms by managing vegetation for a variety of species, in particular, in and around farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

2.11.0.41 Increase structural habitat diversity through the implementation of a variety of vegetation management practices such a prescribed burns (either increasing or decreasing their frequency depending on the site and objective), plantings, etc. that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.12 Water management

2.12.1 Ditch plugs

2.12.1.1 Implement best management practices (BMPs), protective strategies, and guidelines for ditch plugging to maintain and enhance healthy, resident and migratory SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.12.3 Drainage

2.12.3.2 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) such as removing drainage ditches to restore natural stream flows and wetlands, that benefit wildlife inhabiting these areas.

2.12.3.3 Remove tile drains and drainage ditches to improve wetland hydrology and restore natural stream flows during appropriate times to avoid sensitive periods (e.g., nesting, denning, roosting) and minimizes harm to wildlife, particularly SGCN.

2.12.3.4 Expand the acreages and enhance the effective size of SGCN habitats by reclaiming/restoring adjacent, degraded habitats by removing tile drains and drainage ditches.

2.12.3.5 Remove drainage ditches adjacent to roads to decrease the attraction for amphibians, reptiles and small mammals, and thereby minimizing road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.12.3.6 Protect significant natural and/or unique communities by and when removing tile drains and drainage ditches.

2.12.3.11 Implement best management practices (BMPs), protective strategies, and guidelines when removing tile drains and drainage ditches to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.14 Wildlife disease management

2.14.0 Wildlife disease strategy development and investigation

2.14.0.1 Investigate diseases/pathogens impacting SGCN and/or their habitats.

2.14.0.2 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

2.14.0.3 Protect SGCN from exotic pathogen introduction or incident through implementation of a "rapid response plan"; DFW to give priority attention to these species in planning and/or implementing a response.

2.14.0.4 Conduct long-term monitoring of diseases in vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts.

2.14.0.5 Assess the impacts of diseases on the life cycles of wildlife.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.6 Conduct long-term studies on resident and migratory SGCN to determine if there are changes to the populations' demography (productivity, survival, dispersal) and/or to their critical and/or supporting habitats (i.e., diminishing in value, acreage or connectivity, etc.), in particular changes that would not maintain SGCN at viable levels for species populations. Update data and GIS maps; provide updated information to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.11 Develop, implement and evaluate the effectiveness of town plans that avoid impacts to SGCN species and their habitats.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.14 Identify areas with invasive, aquatic plants and animals and collect a detailed baseline assessment of the species' status and distribution. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort. Researchers and contractors performing Forest Stewardship Inventories and/or Plans on state lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.0.0.15 Conduct long-term monitoring of areas identified as having invasive, aquatic plants and animals to track the species' status/progress over time with or without the implementation of management strategies. Areas without management strategies should be assessed and prioritized for management/control. Areas where management strategies are being implemented should include an assessment of the management effort and identify/recommend and implement necessary changes to improve its success. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort.

3.0.0.19 Identify the presence and status (e.g., functioning, structure, slated for removal, etc.) of existing dams and culverts within and/or that may impact SGCN and their habitats, and create a database that includes a GIS component identifying the locations of such structures and their status. Share this information with appropriate organizations and/or agencies evaluating the benefits and risks of such structures on SGCN and their habitats.

3.0.0.20 Once baseline data identifying and describing the status of existing dams and culverts have been gathered, conduct evaluations at a variety of sites to determine whether the benefits of culvert and dam creation or removal outweigh the risks to SGCN species and their habitats, and if other variables/conditions specific to individual sites/locations result in a different outcome. Identify and target appropriate dams and culverts for removal and/or reconstruction to minimize harm to SGCN species and their habitats.

3.0.0.23 Identify (through wildlife and aquatic system surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and research water quality parameters for all [types of] aquatic systems for various SGCN populations.

3.0.0.26 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species including objectives and guidance pertaining to and the condition/status of critical and supporting habitats.

3.0.0.27 Evaluate the effectiveness of strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals through research and monitoring. Develop and provide NJ DEP and other appropriate governing agencies/commissions a summary of findings and recommendations to improve such efforts.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.2 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.0.3 Survey for and monitor populations of freshwater aquatic focal SGCN to assess the populations' demography, trends, condition, distribution, etc.

3.2.0.4 Conduct long-term monitoring of the impacts of contaminants to vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.2.0.5 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

3.2.0.6 Develop, implement and conduct studies to evaluate the effectiveness of methods implemented to reduce road mortality of wildlife (e.g. wildlife underpasses, road closures).

3.2.0.7 Track (via a database that includes a GIS component) and research problematic species and diseases to determine their distribution, impacts on SGCN wildlife/wildlife communities, and develop potential control measures.

3.2.0.8 Implement and conduct long-term monitoring of control measures aimed at minimizing the impacts of problematic species and/or diseases to evaluate the effectiveness of such efforts and to identify and incorporate additional strategies as appropriate.

3.2.0.10 Evaluate the effectiveness of sanitation/decontamination protocols in minimizing the transference of wildlife diseases and invasive plant species.

3.2.0.11 Investigate the impacts of ORV use as a mechanism to spread wildlife diseases and invasive plant species to native wildlife and habitats. Integrate this information when mapping undeveloped roads and trails to identify potentially sensitive areas in northern NJ forests.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.2 Age, size and sex structure

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.3 Baseline inventory

3.2.3.6 Investigate the feasibility and potential for success of conducting genetic rescue through translocation and/or reintroduction of animals into suitable habitat that was historically occupied to increase genetic diversity and reconnect isolated populations. Methods of investigation should include, but are not limited to, thorough literature reviews, expert opinions, identifying potential pitfalls (e.g., species' fidelity to their range or critical areas), and an examination of historic and current SGCN population distribution and suitable habitat availability.

3.2.3.7 Identify roads or portions of roads, paved or unimproved (through site surveys, land use/land cover assessments and analyses, review of available data, enlistment of species experts, etc.) with high incidences of road mortality and/or presence of snakes, turtles, medium-sized and large mammals. Conduct assessments of the roads and incorporate information into a database that includes descriptions (e.g., qualifiers to help prioritize the roads' risk to wildlife) and a GIS component of the locations of such areas. Share this information with appropriate organizations and/or agencies working to implement measures (e.g., wildlife passages, road closures) to minimize the risk to these species.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.6 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) that could, through revegetation and/or enhancement efforts, become suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN.

3.3.1.17 Identify and map undeveloped roads and trails in all conserved forests, and create a database of locations. Integrate information regarding potentially sensitive areas.

3.3.1.18 Conduct an assessment using available data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels.

3.3.1.19 Identify and codify legal ORV access areas on state (and if appropriate, other conserved) lands. Provide GIS mapping to the landowner for potential use in directing such recreational activities.

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.2 Monitoring

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.4 Protect water quality and aquatic-dependent species by appropriately designating Category 1 waters and enforcing protective regulations. Seek appropriate classifications for stream segments based on Endangered and Threatened Status and/or the Index of Biotic Integrity (IBI) results that do not fulfill Category One requirements.

3.3.2.5 Conduct long-term monitoring of water quality of SGCN aquatic habitats (and aquatic systems feeding into those habitats) to evaluate protection and management efforts to reduce, if not eliminate, chemical contamination, siltation, eutrophication, and other forms of pollution/contamination of aquatic systems.

3.3.2.10 Evaluate the efficacy and success of different management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.3.2.12 Evaluate and compare the effectiveness of different management techniques (e.g., prescribed burning, mowing, brush-hogging, etc.) for maintaining suitable habitat for grassland-dependent species and species dependent upon early successional habitats.

3.3.2.14 Research and evaluate the effectiveness of water quality management practices on water-dependent and semi-dependent SGCN, particularly those practices associated with permitting or mitigation actions.

3.3.2.15 Investigate the effectiveness of management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.3.2.20 Once a system is developed for reporting and qualifying new locations of invasive species, develop, implement and monitor/evaluate invasive species removal strategies at identified locations. Priority should be given to those areas critical to SGCN and/or contain unique and/or rare plant communities supporting SGCN and/or other fish/wildlife species.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.3 Develop/improve management techniques that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.8 Develop best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5.3.9 Develop strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.14 Develop aquaculture practices in the coastal areas that are compatible with the recovery of SGCN.

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.3.16 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.3.21 Develop management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.22 Identify (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) and modify management strategies (e.g., timing restrictions for mowing, cooperative agreements with utility companies for maintenance of rights-of-ways), based on research, that maintain and enhance large existing areas of grassland in perpetuity.

3.5.3.23 Revise water quality management practices based on research on water-dependent and semi-dependent SGCN, particularly when associated with permitting or mitigation actions.

3.5.3.24 Based on research, modify management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.5 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

3.5.4.7 Investigate the feasibility and potential for success of conducting genetic rescue through translocation and/or reintroduction of animals into suitable habitat that was historically occupied to increase genetic diversity and reconnect isolated populations. Methods of investigation should include, but are not limited to, thorough literature reviews, expert opinions, identifying potential pitfalls (e.g., species' fidelity to their range or critical areas), and an examination of historic and current SGCN population distribution and suitable habitat availability.

3.5.4.9 Conduct studies to evaluate the impacts of roads on SGCN and develop, implement and conduct studies to evaluate the effectiveness of methods to reduce road mortality of wildlife (e.g. wildlife underpasses, road closures).

3.5.4.13 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.17 Investigate new, non-invasive techniques for SGCN population evaluation through literature review, expert opinion, trial studies (if low risk), etc.

3.5.4.18 Investigate the effectiveness of survey techniques through selected “ground truthing” and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

3.5.4.21 Develop BMPs to address problematic species and diseases of unknown origin.

3.5.4.22 Investigate the efficacy of implementing strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.3 Secure and protect riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.4 Secure and protect fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.3 Increase the protection of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through conservation area designations.

6.4 Private lands agreements

6.4.0 Private land agreement strategies

6.4.0.1 Enter into private lands agreements to expand control burns on private lands, in particular those adjacent to conserved lands to improve SGCN habitats.

7 Law Enforcement

7.1 Law enforcement

7.1.3 Sub-national Level

7.1.3.2 Increase the number of law enforcement officers tending to wildlife issues to a reasonable number to sufficiently cover the State and marine waters.

7.1.4 Scale Unspecified

7.1.4.1 Improve enforcement of policies and/or regulations that promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

7.1.4.3 Increase law enforcement presence proximate to sensitive areas [e.g., avian nesting sites, in particular rookeries, and reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively)] to deter human activity and subsequent disturbance to SGCN.

7.1.4.6 Recruit law enforcement to assist in the protection and enhancement of SGCN populations, in particular endangered species, through improved awareness of species through trainings, partnerships, and other methods. Information should include but is not limited to: 1) Issues concerning illegal collection of reptiles, 2) Persecution of rare snakes, 3) Illegal recreational activities on public lands (e.g., off-road vehicles) and their impact on wildlife, 4) Identification of sensitive areas, critical sites and/or "hot-spots" for collection.

7.1.4.7 Increase law enforcement presence to enforce regulations governing recreational activities (e.g., the use of personal watercraft and off road vehicles, caving, rock climbing, etc.) on conserved lands and within other sensitive habitats, and discourage activities that cause harm or disturbance to vegetation, wetlands, fish and wildlife.

7.1.4.9 Implement policies that improve and secure habitat connections between conserved SGCN habitats.

7.1.4.10 Implement policies that promotes expanding acreages and enhances the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.16 Implement policies that protect and restore riparian areas.

7.1.4.17 Improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

7.1.4.23 Implement policies that minimize wildlife road mortality.

7.1.4.26 Educate law enforcement personnel that there may be unauthorized research projects taking place and to encourage them to investigate any activities that appear to be harmful to wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.2 Develop a team of personnel from government entities, conservation organizations and other stakeholders engaged in oil/gas spill response for marine and freshwater habitats to develop a feasible plan for oil spill response and/or to amend NJ's current oil spill response plan that clearly outlines each organizations responsibilities and an assessment and location list of available equipment for boom deployment during oil spills.

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.1.0.14 Engage DOD in a constructive dialogue regarding strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities.

8.1.0.15 Engage government agencies, conservation partners and other stakeholders in discussions encouraging and supporting the creation of laws and policies requiring vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

8.1.0.16 Engage local governments in discussions regarding the importance of them adopting/passing ordinances which require assessing and addressing secondary impacts (i.e., ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

8.1.0.17 Engage municipalities in constructive dialogue to identify and minimize destruction of areas prioritized for early succession forest management.

8.1.0.18 Engage NJDOT, NJ Transit Authority and other road management entities, wildlife conservation organizations/agencies (e.g., Division of Fish and Wildlife, New Jersey Conservation Foundation, Conserve Wildlife Foundation of NJ), and communities and citizens in discussions regarding the importance of and methods to enhance habitat connectivity, and work together to develop feasible strategies for ensuring that wildlife can disperse naturally and safely across roads and similar barriers to terrestrial and/or aquatic habitats.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.21 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation human-subsidized and/or overabundant, native species cause to local nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.22 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation invasive species cause to native nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.26 Coordinate across federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to woodland landowners to adopt or endorse consistent best management practices concerning controlled burns to maintain and/or improve forested habitat for wildlife.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.33 Engage government agencies, conservation partners and other land managers, communities, landowners, and commercial and industrial stakeholders in discussions regarding the importance of protecting and methods to protect priority wetlands beyond the levels afforded through regulation by maintaining and/or restoring optimal biological buffers around wetlands.

8.1.0.34 Work with the NJ Education Association and Department of Education to design curriculum and outdoor experimental learning opportunities, and provide training to teachers on implementation of these activities.

8.1.0.37 Enlist landowners and NJ citizens in the protection of and survey efforts for SGCN, in particular rare species, by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management and wildlife-related volunteer programs.

8.1.0.40 Encourage researchers, land managers, naturalists and enthusiasts to follow proper procedures for the coordination and/or permitting of research/management activities involving wildlife and sensitive habitats, and discourage activities that alter vegetation or wetlands, or cause harm or disturbance to wildlife.

8.1.0.42 Engage citizens, wildlife observers and photographers through discussions and distributable information regarding the importance of and encouraging implementing responsible and ethical behavior when observing wildlife by developing an alliance of wildlife photographers and widely circulating recommendations on how to reduce impact.

8.1.0.44 Engage conservation partners, stakeholders, government agencies and other land stewards in constructive dialogues encouraging their inclusion of controlled burns in forest and other stewardship plans.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.8 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate recreationists and encourage landowners to eliminate garbage in the vicinity of suitable wildlife habitat, in particular SGCN habitat. Information should include the detrimental impacts garbage may have on various wildlife species.

8.3.0.9 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners and land managers to include only native plants in landscaping and restoration projects. Provide information to assist them in detecting problematic establishment of invasive, non-indigenous plants.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.15 Develop an educational outreach program for citizens regarding: 1) The impacts to wildlife as a result of plastic bags entering aquatic and marine systems, 2) The importance of decreasing the amount of plastic shopping bags in circulation, 3) The need for businesses to voluntarily charge for bags or reimburse people for using their own non-plastic bags, and 4) The need for their assistance through public pressure on legislators and government to pass legislation that that limits the amount of plastic shopping bags in circulation.

8.3.0.19 Develop an educational outreach program for the public on the devastating effects predators can have on native nesting wildlife.

8.3.0.25 Develop educational outreach programs for landowners, nurseries and the general public regarding the negative impacts of invasive and non-native plants on our natural communities.

8.3.0.27 Develop educational outreach programs for public and private landowners and land managers regarding the importance of structural habitat diversity, methods to increase diversity, and/or incentive programs available to increase habitat diversity.

8.3.0.29 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about the importance of maintaining a vegetative buffer along riparian and aquatic habitats to intercept storm water runoff and minimize soil erosion.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.4 Develop a plan that directs the creation of new impoundments and/or the expansion of bogs for cranberry farming within or immediately adjacent to critical forested habitats in a manner that minimizes impacts on the natural hydrology of the watershed and subsequently, the natural wetlands in the area.

9.1.0.8 Develop a plan that focuses on strategies for oil pipelines to avoid sensitive habitats that would be highly impacted by oil spills.

9.1.0.12 Develop a plan to avoid freshwater tidal management.

9.1.0.13 Develop a plan to minimize agriculture that would result in groundwater withdrawal in critical forested areas.

9.1.0.14 Develop a plan to minimize development that would result in groundwater withdrawal in critical forested areas.

9.1.0.15 Develop a plan to minimize fragmentation of terrestrial and aquatic habitats by roads.

9.1.0.16 Develop a plan to minimize new lawnscapes and preserve natural vegetation within and adjacent to critical forest areas.

9.1.0.17 Develop a plan to minimize nutrient and effluent loads from aquaculture practices.

9.1.0.18 Develop a plan to minimize the effects of road widening and traffic volume increases within critical wildlife habitat areas using CHANJ products.

9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

9.1.0.20 Develop a plan to minimize the impacts of existing agricultural properties adjacent to and the conversion of forest habitats (terrestrial and aquatic, within or adjacent to critical forests) to agriculture, grazing areas/livestock farms, and plantations.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.23 Develop a plan to mitigate the effects of transportation barriers by using CHANJ products.

9.1.0.27 Develop a plan to use wildlife-appropriate culverts in critical forested areas.

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.31 Develop wetland restoration plans that consider the life history and needs of wildlife occupying targeted habitats.

9.1.0.32 Incorporate aquatic habitat connectivity and water quality/effluent standards into local and state aquaculture plans and BMPs.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.5 Develop response plans to address disease outbreaks within wildlife populations, in particular SGCN.

9.3.1.6 Amend NJ's current oil spill response plan to 1) expand the geographic area addressed, 2) expand the targeted species impacted and in need of recovery, and 3) revise current and integrate new actions into the plan as needed.

9.3.1.7 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.10 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.15 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.1.16 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.2 Listed species recovery planning

9.3.2.1 Develop proactive species recovery plans for all endangered and threatened species including guidance and objectives pertaining to critical and supporting habitat to meet and maintain recovery goals.

9.3.3 Habitat management planning

9.3.3.6 Develop a management plan for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

9.3.3.8 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.3.9 Develop a response plan to outbreaks using BMPs to control infestations and limit their spread in a way that avoids excessive harm to non-target species.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.16 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.3.17 Develop a management plan for prescribed burning that will benefit Pinelands dependent species and increase or maintain habitat quality for these species in the Pinelands.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.21 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.3.22 Create management plans to minimize and/or prevent wildlife road mortality that will incorporate wildlife passages in conjunction with barrier fencing and, where possible, seasonal closures. Aquatic-associated passages must avoid disturbance to the natural streambeds and riparian habitat, permit high volumes of water to flow freely, and provide adequate travel corridors for terrestrial wildlife, while maintaining stream flow for fish passage. Bridges that span rivers and streambeds and include floodplain habitat on either side of the span to provide travel corridors for terrestrial wildlife are preferred over culverts.

9.3.3.24 Develop a plan to improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

9.3.3.28 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.3.32 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3.34 Include controlled burn prescriptions in forest and stewardship plans to improve wildlife habitat.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.3 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.9 Review strategies for creating or enhancing connectivity (e.g., installing appropriately-sized wildlife passages) between wetlands to allow wildlife to disperse naturally and safely.

11.1.1.10 Use CHANJ mapping in reviews of proposed energy, mining, transportation and utility service companies/agencies' projects to attempt to maintain habitat connectivity and reduce fragmentation, and identify potential impacts of the projects.

11.1.1.11 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed offshore energy projects relating to drilling, extraction and distribution of petroleum and gas products to reduce habitat destruction and minimize impacts on wildlife.

11.1.1.12 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed solar farm projects to reduce habitat fragmentation and minimize impacts on wildlife.

11.1.1.13 Use the best available science (species data, habitat present, wind farm layout options, wind blade impacts on migratory species, location of migration routes, etc.) when conducting regulatory reviews of proposed wind farm projects to minimize impacts on migratory and resident wildlife and reduce habitat fragmentation.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.2.2 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.2.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into the environmental review process to help establish policies and plans that minimize the impact of aquaculture on fish and wildlife.

11.1.2.4 Review strategies for creating or enhancing connectivity (e.g., installing appropriately-sized wildlife passages) between wetlands to allow wildlife to disperse naturally and safely.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.2 Provide technical support to public and private landowners and land managers for controlling invasive, native and non-native plant species in order to increase structural habitat diversity.

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.7 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on the importance of maintaining habitat connectivity, minimizing fragmentation, and the use of CHANJ products to help them target areas for such planning.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.14 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters), and to enhance or restore biologically appropriate buffers.

11.2.0.15 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and landowners about the importance of retaining and in an effort to protect, create, enhance and/or restore vegetation along aquatic habitats.

11.2.0.18 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats.

11.2.0.22 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

11.2.0.23 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to SGCN habitats to promote the protection and/or enhancement of those adjacent habitats to increase the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and that connect conserved SGCN habitats.

11.2.0.24 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers on how to manage vegetated roadside areas (e.g., mowing, brush-hogging, etc.) on a schedule that avoids peak activity periods for wildlife and therefore, minimizes harm.

11.2.0.25 Provide educational resources, training programs, and on-the-ground guidance to resource managers regarding the assessment of and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) related to residential and commercial development.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.1 Engage partners and stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.3 Provide educational resources, training programs, and on-the-ground guidance to DOD to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop and implement forest management and other practices that minimize disturbances to SGCN (i.e., beyond their federal requirements).

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

11.2.2 With private landowners

11.2.2.1 Provide technical support to farming operations and woodland landowners on ways to decrease clean farming (edge-to-edge) practices and create ecotones to benefit bobwhite and other species dependent on early successional habitat.

100 Law and Policy

100. Legislation

100.1.2 National Level

100.1.2.1 Create legislation to establish markets for warm-season grasses to increase the permanency of this crop on the landscape.

100.1.3 Sub-national Level

100.1.3.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.3.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.4 County and Local

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.3 Expand the acreages and enhance the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN through local ordinances.

100.1.4.4 Secure wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and biologically appropriate buffers through local ordinances.

100.1.4.5 Secure SGCN-inhabited/used freshwater wetlands and biologically appropriate buffers through local ordinances.

100.1.4.11 Secure riparian areas through local ordinances.

100.1.4.13 Encourage municipal laws regulating domestic pets that may predate on wildlife.

100.1.4.14 Adopt/pass local ordinances which require assessing and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.5.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.5.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into state/local policy to minimize the impact of aquaculture on fish and wildlife.

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100.1.5.5 Develop legislation to provide financial support for the New Jersey Invasive Species Strike Team.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.1 Develop (and/or improve) policies and/or regulations that will promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

100.3.0.5 Develop policies that will promote improved and secure habitat connections between conserved SGCN habitats.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.13 Develop policies that will promote protecting and restoring riparian areas.

100.3.0.14 Develop policies and/or regulations that increase the protective buffers of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) to biologically appropriate distances to benefit SGCN that rely upon these habitats and improve the function of the [associated] aquatic systems.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.20 Develop policies and/or regulations that prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

100.3.0.21 Develop policies that minimize wildlife road mortality through: 1) Requiring the integration of wildlife passages into all new and repaired roads, in particular those areas that will connect SGCN habitats, 2) Requiring current fish/wildlife passages be improved and maintained in perpetuity, 3) Supporting seasonal road closures, in particular for unimproved roads, 4) Supporting projects that work to improve connectivity of SGCN habitats such as land conservation through acquisition or other means.

100.3.0.31 Create or expand tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMPs.

100.3.0.36 Create legislation to limit the amount of plastic from shopping bags in circulation and re-instate incentives for citizens bringing their own shopping bag to grocery store.

100.3.0.40 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.45 Increase the controlled burn season to focus on restoring vegetative communities.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.48 Propose new State law or regulation mandating that a State-level "development impact fee" be assessed on all new development approved by municipalities (via the Municipal Land Use Law processes), and dedicate such monies to the development and implementation of regional Habitat Conservation Plans (or existing plans/programs serving the same regional function).

100.3.0.49 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address the issue of disturbance to habitat or species as a result of human activities (e.g., construction, bridge maintenance, road work, etc.).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.53 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded rights-of-way corridors associated with energy transport/transmission.

100.3.0.54 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded surface mining areas.

100.3.0.57 Develop regulations that when implemented will improve and secure habitat connections between conserved SGCN habitats.

100.3.0.58 Develop regulations that when implemented will promote the expansion of acreages and enhancement of the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.64 Develop regulations that when implemented will protect and restore riparian areas.

100.3.0.69 Develop regulations that when implemented will minimize wildlife road mortality.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.2 Create a policy that requires the NJ DEP to incorporate scientific information regarding climate change and sea level rise (e.g., predictions, habitat management/acquisition efforts to enhance resilience to inundation) on their websites and to work with other government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

100.4.0.3 Develop policies for mandatory buffer strips on preserved farmlands and state-owned agricultural lands.

100.4.0.4 Create a policy that requires the use of wildlife habitat and corridor mapping products for both regulatory use when conducting project reviews and planning/siting new or expanded rights-of-way projects.

100.4.0.8 Develop a white paper addressing the impacts that existing, new or expanded rights-of-way have upon wildlife, wildlife habitats and habitat connectivity.

100.4.0.9 Develop and implement policies to minimize the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats in order to benefit wildlife.

100.4.0.12 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.4.0.13 Develop policies for different circumstances (e.g., roadsides and medians, riparian, aquatic and terrestrial habitats) that outline appropriate habitat/vegetation management strategies and schedules to minimize risks to and benefit wildlife.

100.4.0.16 Develop policies to implement habitat management strategies that will increase the structural diversity surrounding areas used for energy, mining, and transportation and service corridors which include but are not limited to the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-

100.4.0.17 Develop policies to implement habitat management strategies, including prescribed burns, that will increase the structural diversity on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies to control and reduce the impacts of invasive, non-native species in order to increase structural habitat diversity.

100.4.0.18 Develop policies to minimize the extent of infrastructure associated with energy and service corridors or areas (e.g., wind and solar farms, pipelines, utility lines) and that require the implementation of habitat management strategies that will increase the structural diversity in the area including (e.g., the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides).

100.4.0.19 Develop regulations that will minimize the creation of new barriers, remove or replace current barriers with appropriately-sized systems to accommodate wildlife dispersal, and to minimize road widening and traffic volume increases within critical wildlife habitat areas.

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.24 Develop policies to provide financial support for the New Jersey Invasive Species Strike Team.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Eastern Box Turtle

Focal species that comprise this Conservation Target:

Eastern Box Turtle

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:

1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.1.1.2 Loss, alteration and/or degradation of habitat.

1.1.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.

1.1.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.

1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:

1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.2.1.2 Loss, alteration and/or degradation of habitat.

1.2.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.

1.2.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.

1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:

1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.3.1.2 Loss, alteration and/or degradation of habitat.

1.3.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.

1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture (Avg. Score: 2.00)

NJ Specific Threats:

2.1.1.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.1.5 Lack of competitive market prices to maintain native grasslands causes conversion to other crops that have more monetary value but less value as wildlife habitat.

2.1.2 Small-holder Farming (Avg. Score: 1.00)

NJ Specific Threats:

2.1.2.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.2.2 Fragments terrestrial and aquatic habitats.

2.1.2.3 Agricultural practices (e.g., mechanized, row-crop agriculture) can render lands unsuitable for most wildlife due to soil degradation and erosion.

2.1.2.4 Agricultural practices (e.g., mechanized, row-crop agriculture) can cause direct mortality to wildlife when harvesting takes places.

2.1.2.5 Lack of competitive market prices to maintain native grasslands causes conversion to other crops that have more monetary value but less value as wildlife habitat.

2.1.3 Agro-industry (Avg. Score: 2.00)

NJ Specific Threats:

2.1.3.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.3.2 Fragments terrestrial and aquatic habitats.

2.1.3.3 Agricultural practices (e.g., mechanized, row-crop agriculture) can render lands unsuitable for most wildlife due to soil degradation and erosion.

2.1.3.6 Lack of competitive market prices to maintain native grasslands causes conversion to other crops that have more monetary value but less value as wildlife habitat.

2.2 Wood and Pulp Plantations

2.2.1 Small Holder (Avg. Score: 2.00)

NJ Specific Threats:

2.2.1.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.2.1.2 Tree harvesting can cause direct mortality to wildlife, especially if done during peak activity periods or vulnerable life stages (e.g., denning, nesting, gestation/birthing, basking, roosting, pre-volancy, etc.).

2.2.2 Agro-industry Plantations (Avg. Score: 1.00)

NJ Specific Threats:

2.2.2.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.2.2.2 Tree harvesting can cause direct mortality to wildlife, especially if done during peak activity periods or vulnerable life stages (e.g., denning, nesting, gestation/birthing, basking, roosting, pre-volancy, etc.).

2.3 Livestock Farming and Ranching

2.3.2 Small-holder Grazing (Avg. Score: 1.00)

NJ Specific Threats:

2.3.2.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.2.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

2.3.3 Agro-industry Grazing (Avg. Score: 1.00)

NJ Specific Threats:

2.3.3.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.3.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

3 Energy Production and Mining

3.1 Oil and Gas Facilities and Pipelines

3.1.1 Distribution processes of petroleum and other liquid hydrocarbons (Avg. Score: 2.00)

NJ Specific Threats:
- 3.1.1.1 Fragments terrestrial and aquatic habitats.
- 3.1.1.2 Loss, alteration and/or degradation of habitat.
- 3.1.1.3 Increased risk of oil spills.
- 3.1.1.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.

3.1.2 Natural gas distribution processes (Avg. Score: 2.00)

NJ Specific Threats:
- 3.1.2.1 Fragments terrestrial and aquatic habitats.
- 3.1.2.2 Loss, alteration and/or degradation of habitat.
- 3.1.2.3 Increased risk of gas leaks and explosions.
- 3.1.2.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.

3.2 Mining and Quarrying

3.2.2 Surface Mining - Rock Quarry (and sand quarries) (Avg. Score: 2.00)

NJ Specific Threats:
- 3.2.2.1 Fragments terrestrial and aquatic habitats.
- 3.2.2.2 Loss, alteration and/or degradation of terrestrial and aquatic habitats.
- 3.2.2.3 Increased risk of vehicle strikes/mortality to wildlife.

3.3 Renewable Energy

3.3.1 Wind Power (Avg. Score: 1.00)

NJ Specific Threats:
- 3.3.1.2 Fragments terrestrial habitats.
- 3.3.1.3 Loss, alteration and/or degradation of habitat.
- 3.3.1.4 Increased commercial infrastructure.

3.3.2 Solar Power (Avg. Score: 2.00)

NJ Specific Threats:
- 3.3.2.1 Fragments terrestrial habitats.
- 3.3.2.2 Loss, alteration and/or degradation of habitat.
- 3.3.2.3 Increased commercial infrastructure.

3.4 Conventional Power Plants

3.4.0 Conventional Power Plants (Avg. Score: 2.00)

NJ Specific Threats:
- 3.4.0.2 Loss, alteration and/or degradation of habitat due to new or the expansion of current facilities.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:
- 4.1.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species and inhibiting dispersal of non-volant animals, reducing gene flow.
- 4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.
- 4.1.1.4 Re-establishment of abandoned railroad lines may increase the risk of direct mortality on wildlife.

4.1.1.5 Re-establishment of abandoned railroad lines may decrease turtles' abilities to disperse due to their difficulty traversing the railroad ties and tracks, leading to decreased genetic exchange.

4.1.2 Movement of cars and other vehicles on roads and railroads (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats: 4.1.2.1 Increased vehicle traffic increases the risk of wildlife mortality from strikes.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads (Avg. Score: 2.00)

NJ Specific Threats: 4.2.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species, inhibiting dispersal of non-volant animals, reducing gene flow, and creating barriers to fish when service line-associated roads cross streams (e.g., bridges, culverts, fords, etc.).

4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

4.2.2 Management of rights-of-way or communication tower facilities and/or their associated access roads (Avg. Score: 2.00)

NJ Specific Threats: 4.2.2.1 Improper or poorly scheduled vegetation management can cause direct mortality to and may reduce productivity of wildlife.

5 Biological Resource Use

5.1 Hunting and Collecting Terrestrial Animals

5.1.1 Intentional Use (Avg. Score: 3.00)

NJ Specific Threats: 5.1.1.1 Illegal collection of wildlife can have detrimental impacts on populations.

5.1.2 Unintentional effects (Avg. Score: 1.00)

NJ Specific Threats: 5.1.2.2 Disruption of normal wildlife behavior.

5.2 Gathering Terrestrial Plants

5.2.3 Control (Avg. Score: 1.00)

NJ Specific Threats: 5.2.3.2 Clearing of scrub-shrub vegetation [and snags] diminishes cover and nesting habitat.

5.3 Logging and Wood Harvesting

5.3.1 Intentional Use (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.1.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.1.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.1.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.1.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.1.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.2 Intentional Use (large scale) (Avg. Score: 2.00)

NJ Specific Threats: 5.3.2.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.2.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.2.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.2.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.2.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.3 Unintentional effects (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.3.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4 Unintentional effects (large scale) (Avg. Score: 2.00)

NJ Specific Threats: 5.3.4.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4.2 Extensive infrastructure and larger equipment requirements present a potential risk of direct injury/mortality to wildlife.

5.3.4.5 Lack of appropriate, sustainable forest management can lead to a decrease in forest habitat diversity, degraded habitat for many forest species, the loss of habitat for early-successional species, and/or the loss of unique habitats for species that need canopy breaks and multi-aged tree composition to fulfill various life history requirements.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized) (Avg. Score: 2.00)

NJ Specific Threats: 6.1.1.1 Inappropriate use of off-road vehicles creates new roads/trails which fragments habitat.

6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.

6.1.1.3 Increased risk of harassment that results in a change in wildlife behavior and/or direct mortality from vehicle strikes.

6.1.1.6 Off-road vehicles can be a mechanism of transference of wildlife diseases and invasive plant species if gear and apparel are not properly sanitized between sites.

6.1.5 Wildlife observation and photography (Avg. Score: 1.00)

NJ Specific Threats: 6.1.5.1 Improperly conducted recreational activities may disrupt normal wildlife behaviors which can result in reduced reproductive success or survival, abandonment of critical sites, etc.

6.1.5.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.2 Military Exercises

6.2.1 Military exercises (Avg. Score: 2.00)

NJ Specific Threats: 6.2.1.1 Military testing and training exercises may inflict disturbance and potential physical harm to wildlife.

6.2.1.3 Lack of opportunity for non-federal wildlife managers to influence activities on military bases may result in detrimental impacts to SGCN and/or missed opportunities to engage in projects that benefit SGCN.

6.3 Work and Other Activities

6.3.1 Unauthorized research projects at significant habitats (Avg. Score: 2.00)

NJ Specific Threats: 6.3.1.1 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.1.2 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.2 Authorized research projects at significant habitats (Avg. Score: 2.00)

NJ Specific Threats: 6.3.2.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.2.3 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.3 Other "work" unrelated to research (Avg. Score: 1.00)

NJ Specific Threats: 6.3.3.1 Construction projects may disrupt normal wildlife behavior which can result in reduced reproductive success or survival, abandonment of critical sites, etc. (e.g., bridge-nesting birds).

6.3.3.4 Workers may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

7 Natural Systems Modifications

7.1 Fire and Fire Suppression

7.1.1 Increase in Fire Frequency/Intensity (Avg. Score: 2.00)

NJ Specific Threats: 7.1.1.1 Increase in frequency and intensity of wild fires as a result of droughts and heat waves drying out vegetation and litter.

7.1.1.2 Increase in frequency of wild fires as a result of illegal activities.

7.1.1.3 Unnatural fire regimes occurring as a result of military exercises.

7.1.1.4 Lack of diversity in age structure and composition of vegetation due to expansive, frequent fires.

7.1.2 Suppression of Fire Frequency/Intensity (Avg. Score: 2.00)

NJ Specific Threats: 7.1.2.1 Shift in vegetative communities as a result of suppression of natural fires.

7.1.2.2 Lack of diversity in age structure and composition of vegetation due to the suppression of fire.

7.2 Dams and Water Management/Use

7.2.12 Culverts (Avg. Score: 2.00)

NJ Specific Threats: 7.2.12.1 Improper design, placement, installation and maintenance of culverts and other stream crossing structures can impede or prevent the movements of terrestrial organisms and can restrict or limit stream flow, impeding the movement of aquatic organisms along riparian corridors.

7.2.13 Stream Burial (Avg. Score: 1.00)

NJ Specific Threats: 7.2.13.2 Eliminates in-stream habitat and water resources for wildlife.

7.3 Other Ecosystem Modifications

7.3.2 Inappropriate timing of mowing (Avg. Score: 3.00)

NJ Specific Threats: 7.3.2.1 Increased risk of direct mortality and/or reduced productivity of wildlife, as well as reduced use by migrating species.

7.3.3 Removal of coarse woody debris (streams, forests, scrub-shrub habitats) (Avg. Score: 1.00)

NJ Specific Threats:
- 7.3.3.2 Decreases habitat and/or corridor suitability due to limited or absent shelter and foraging habitat.
- 7.3.3.3 Removal of dead trees (snags), large felled logs (i.e., those > 12" dbh), and other downed woody material diminishes nesting, roosting, and sheltering options for wildlife, and increases the ease at which deer can browse regenerating vegetation.
- 7.3.3.4 Decreases available basking, shelter, and foraging habitats.

7.3.4 Lack of natural disturbance patterns or ecosystem functions due to species loss (Avg. Score: 1.00)

NJ Specific Threats:
- 7.3.4.5 The lack of forest disturbance minimizes the diversity of herbaceous vegetation and other shrubs and trees that need a lot of sunlight to grow.

7.3.5 Poor habitat management (Avg. Score: 1.00)

NJ Specific Threats:
- 7.3.5.1 Improper or poorly scheduled maintenance of man-made corridors (e.g., roadsides and medians) can cause direct mortality to and may reduce productivity of wildlife.
- 7.3.5.2 Shifting from natural vegetation to lawns can cause increased temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.
- 7.3.5.3 Vegetation clearing removes terrestrial and riparian corridors for animal movement, shelter, and resting areas.
- 7.3.5.5 Habitat management that alters or removes vegetation without implementing long-term management increases the risk of invasive and exotic plants establishing themselves, outcompeting native vegetation.
- 7.3.5.6 Habitat management, including that which occurs on public and private lands, that does not consider timing and species' behaviors can result in the direct mortality and/or alteration or loss of habitat.
- 7.3.5.7 Improperly planned habitat management and/or mitigation efforts along roadsides and within the medians can attract wildlife and increase the risk of vehicle strikes.
- 7.3.5.12 Lack of diversity in age structure and composition of vegetation due to lack of natural disturbances and/or vegetation management.
- 7.3.5.14 Intentional felling and removal of dead standing trees or snags eliminates resting, nesting or feeding habitat, and precludes the snags eventual contribution to coarse woody debris and forest floor structure and habitat.
- 7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species (Avg. Score: 2.00)

NJ Specific Threats:
- 8.1.1.1 Displace or outcompete native species for resources.
- 8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.
- 8.1.1.3 Invasive, non-native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.
- 8.1.1.4 Invasive, non-native animals increase the risk of predation on native animals and/or herbivory on native vegetation.
- 8.1.1.5 Invasive, non-native animals and plants increase the risk of introduction and transference of diseases
- 8.1.1.6 Invasive, non-native plants may create physical barriers for some species.

8.1.2 Invasive non-native aquatic animals (Avg. Score: 1.00)

NJ Specific Threats: 8.1.2.2 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminishing habitat suitability and reducing ecological integrity of natural communities, and may introduce disease into a population.

8.1.3 Invasive non-native aquatic plants (Avg. Score: 1.00)

NJ Specific Threats: 8.1.3.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.4 Invasive non-native terrestrial/wetland animals (Avg. Score: 1.00)

NJ Specific Threats: 8.1.4.1 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.4.2 Free-roaming and feral domestic animals such as cats and dogs causes direct mortality of wildlife and disturbance to wildlife breeding and resting areas.

8.1.5 Invasive non-native terrestrial/wetland plants (Avg. Score: 1.00)

NJ Specific Threats: 8.1.5.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.6 Invasive non-native fungal/bacterial diseases (Avg. Score: 2.00)

NJ Specific Threats: 8.1.6.1 The introduction of non-native fungal and bacterial diseases threatens native populations and ecosystems.

8.2 Problematic Native Species/Diseases

8.2.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.2.1.1 Overabundant native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

8.2.1.2 Invasive pathogens and insects may increase in range and abundance as limiting factors (such as temperature) are altered as a result of climate change.

8.2.1.3 Invasive, native species can out-compete non-invasive species for resources (food, light, shelter), leading to the demise of some species populations.

8.2.1.4 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.2.2 Named Species (Avg. Score: 2.00)

NJ Specific Threats: 8.2.2.2 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.4 Problematic Species/Diseases of Unknown Origin

8.4.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.4.1.1 Non-native or poorly understood diseases and parasites could potentially impact native animals.

8.4.2 Named Species (Avg. Score: 1.00)

NJ Specific Threats: 8.4.2.2 Diseases of unknown origin, such as snake fungal disease and Ranavirus, can cause significant mortality among native animal populations.

8.5 Viral/Prion-induced Diseases

8.5.1 Unspecified Species (Disease) (Avg. Score: 1.00)

NJ Specific Threats: 8.5.1.1 There is a large knowledge gap regarding the existence of, or potential for, other diseases impacting native wildlife.

8.5.2 Named Species (Disease) (Avg. Score: 2.00)

NJ Specific Threats: 8.5.2.1 Diseases such as West Nile Virus, arenavirus, sudden oak death, Avian Influenza, and snake fungal disease cause morbidity or mortality to native populations.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.2 Industrial and Military Effluents

9.2.1 Oil Spills (Avg. Score: 1.00)

NJ Specific Threats: 9.2.1.1 Oil spills render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.1.2 Oil spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.1.3 Oil spills cause external oiling of wildlife and ingestion of oil, both of which can injure or kill wildlife.

9.2.3 Other (Avg. Score: 1.00)

NJ Specific Threats: 9.2.3.1 Point and nonpoint source pollution such as polychlorinated biphenyls (PCBs), pesticides, heavy metals, and endocrine disrupting compounds (EDC's) into freshwater and marine systems pose threats to wildlife through direct contact and/or ingestion, and to aquatic species and their predators through bioaccumulation, impacting the reproductive success and neurological function of many avian and fish species.

9.2.3.2 Chemical spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.3.3 Chemical spills may render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.4 Other: Hydrofracturing (Avg. Score: 1.00)

NJ Specific Threats: 9.2.4.1 Contaminants from hydrofracturing degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2.4.2 Uncontrolled effluents escaping from hydrofracturing facilities can cause injury to wildlife and alter normal behaviors.

9.2.5 Other: Industrial toxic settling ponds (Avg. Score: 1.00)

NJ Specific Threats: 9.2.5.1 Surficial or open industrial effluent ponds can cause injury or death to wildlife that become exposed through ingestion or submersion.

9.3 Agricultural and Forestry Effluents

9.3.1 Nutrient Loads (Avg. Score: 1.00)

NJ Specific Threats: 9.3.1.1 Chemical fertilizers and nutrient run-off changes the pH in streams, ponds and wetlands and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.3.1.2 Animal waste degrades terrestrial and aquatic habitats, especially streams, ponds and wetlands, resulting in eutrophication, which disrupts oxygen and nutrient balances, and causes injury and mortality to aquatic organisms.

9.3.2 Soil Erosion and Sedimentation (Avg. Score: 1.00)

NJ Specific Threats: 9.3.2.1 Soil erosion, sedimentation and destruction of streambanks and riparian buffers degrade waters making them unsuitable for riparian-dependent wildlife.

9.3.3 Herbicides and Pesticides (Avg. Score: 1.00)

NJ Specific Threats: 9.3.3.1 Pesticides degrade terrestrial and aquatic habitats, especially streams, ponds and wetlands. Aquatic wildlife are particularly sensitive to these contaminants, which can cause developmental and behavioral abnormalities and reproductive failure. Some contaminants may bioaccumulate in predatory fish and birds and disrupt reproduction.

9.3.3.2 Use of rodenticides can cause secondary actions of injury and death to animals in the course of scavenging.

9.3.3.3 Use of pesticides can directly harm non-target species through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture (Avg. Score: 1.00)

NJ Specific Threats: 9.3.5.4 Improper use of current insecticides, such as those containing esfenvalerate, prallethrin, or piperonyl butoxide, or past use of pesticides containing chlordane still present in the soils, are toxic to various wildlife species, and can cause injury, mortality, or other effects that impair population viability.

9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.4 Garbage and Solid Waste

9.4.1 Direct hazards to wildlife (Avg. Score: 1.00)

NJ Specific Threats: 9.4.1.2 Garbage and solid waste destroys natural habitats and obstructs wildlife movements.

9.5 Air-Bourne Pollutants

9.5.1 Acid Rain (Avg. Score: 1.00)

NJ Specific Threats: 9.5.1.2 Leaches calcium from the soils which in turn reduces the availability of prey, particularly calcium-rich prey such as snails.

9.5.4 Other (Avg. Score: 1.00)

NJ Specific Threats: 9.5.4.1 Dust and/or airborne sedimentation from construction sites, agricultural operations or related earth disturbances can introduce mineral or organic sediments into adjacent wildlife habitats, degrading their quality and suitability for wildlife short-term and/or long-term.

9.5.6 Herbicides and Pesticides (Avg. Score: 2.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 1.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.2 Droughts

11.2.1 Droughts (Avg. Score: 2.00)

NJ Specific Threats: 11.2.1.1 Contribute to hardened soils, decreasing water recharge during rains and increasing the likelihood of flash floods during storms.

11.2.1.2 Lead to lower groundwater levels and therefore, less available water for people and habitats.

11.2.1.3 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

11.3 Temperature Extremes

11.3.1 Temperature extremes (Avg. Score: 2.00)

NJ Specific Threats:

11.3.1.1 Increasing temperatures may cause habitat loss and degradation by desiccating and/or raising the temperatures of small wetlands and streams leading to the loss of freshwater mussels and other aquatic species and species reliant upon these habitats.

11.3.1.2 Increased temperatures can negatively impact wetland, riverine, lacustrine and vernal pool-associated or -dependent wildlife by reducing flows, increasing water temperatures, lowering water levels and causing premature drying of vernal habitats.

11.3.1.4 Extremely low temperatures and/or extensive periods of unseasonably low temperatures during critical life history stages (e.g., hibernation, gestation/nesting) can alter animals' behaviors and decrease survivorship.

11.4 Storms and Flooding

11.4.1 Storms and flooding (Avg. Score: 1.00)

NJ Specific Threats:

11.4.1.1 Extreme storms and flooding events threaten aquatic and marine wildlife through habitat degradation and alteration, including alterations to off-shore or back-bay benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic and marine wildlife.

11.4.2 Increased rainfall (Avg. Score: 1.00)

NJ Specific Threats:

11.4.2.1 Extreme rain events threaten aquatic wildlife through habitat degradation and alteration, including alterations to benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic wildlife.

11.4.2.2 Extreme rain events can damage wildlife nesting and resting habitats, including impacts to avian eggs and chick and small mammal survivorship.

11.6 Phenology Shifting or Alteration

11.6.2 Phenology shifts related to predator-prey ecology (Avg. Score: 1.00)

NJ Specific Threats:

11.6.2.1 Alters inter-specific relationships (e.g., competition, parasitism, predation) of wildlife, ultimately leads to detrimental impacts on the ecological system.

11.6.2.2 Shifts timing of species migration, breeding and hibernation, and available food resources, causes redistribution of species, or mortality for species that are unable to relocate due to their already isolated habitat or limited mobility.

11.6.3 Phenology shifts related to species redistribution (Avg. Score: 1.00)

NJ Specific Threats:

11.6.3.1 Shifts in timing of species migration, breeding and hibernation, and available food resources, as a result of wildlife range shifts driven by climate change.

11.6.3.2 Shifts in nesting times or egg incubation durations can limit nest success and longterm populations.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 2.00)

NJ Specific Threats:

12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.2 Lack of up-to-date existing information (Avg. Score: 2.00)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.3 Need to answer research question (Avg. Score: 2.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.4 Need to develop new technique (Avg. Score: 2.00)

NJ Specific Threats: 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 1.00)

NJ Specific Threats: 12.3.0.1 Regulatory habitat protections within state land use regulations are spatially limited to specific geographic areas (e.g., Pinelands, Coastal Area) or geographic features (e.g., wetlands, streams) and so fail to protect critical habitats that exist outside of these regulated areas.

12.3.0.3 Lack of a licensing program and standards for NJ Nuisance Wildlife Control Operators (NWCOs) leads to inadequate controls over handling of wildlife and lack of reporting of non-game/SGCN species (and all wildlife) encountered in nuisance situations.

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 1.00)

NJ Specific Threats: 12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 2.00)

NJ Specific Threats: 14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 2.00)

NJ Specific Threats: 14.2.1.1 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various forest management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 1.00)

NJ Specific Threats: 15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.1 Enhance critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates through incentive programs with adjacent private landowners to increase the effective size of the habitat.

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.4 Secure and promote the protection, restoration, and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts through incentive programs.

1.2.1.5 Secure and promote the protection/restoration of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through incentive programs.

1.2.1.6 Secure and promote the protection/restoration of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers through incentive programs.

1.2.1.7 Secure and promote the protection/restoration of fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.12 Create incentives (non-monetary and/or monetary) for land developers to redevelop abandoned areas (e.g., shopping centers, office complexes) to minimize the loss of natural habitats and reduce the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.18 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and land managers to control and reduce the impacts of invasive, native and non-native species in order to increase structural habitat diversity.

1.2.1.19 Create incentives for federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to farmers, woodland landowners, and private landowners to adopt and/or endorse consistent BMPs concerning controlled burns to maintain and/or improve wildlife habitat.

1.2.1.20 Coordinate across government agencies and non-government organizations to create or expand upon tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMP's.

1.2.1.22 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to horse/livestock farm owners and managers to increase structural habitat diversity in and around the farms by managing vegetation for a variety of species, in particular, farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

1.2.1.23 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to provide cost shares and/or plan approvals for management based on management approaches and prescriptions.

1.2.1.24 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners, with habitat of suitable patch size to support breeding grassland-dependent species, to alter the timing of vegetation management to benefit grassland and pollinator species.

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

1.2.1.28 Create incentives to implement dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

2 Direct Management of Natural Resources

2.2 Dam and barrier removal

2.2.1 Culvert work

2.2.1.1 Replace existing barriers to wildlife movement with and/or install appropriately-sized systems to accommodate wildlife dispersal.

2.3 Fire management

2.3.2 Fuel reduction

2.3.2.1 Prevent wildfires by reducing natural fuel (e.g., leaf litter).

2.3.3 Prescribed burning

2.3.3.1 Evaluate different management techniques of prescribed burns that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

2.3.3.2 Conduct prescribed burning in Northern New Jersey forests to maintain and regenerate a mosaic of upland forest habitats.

2.3.3.3 Conduct prescribed burning to improve wildlife habitat.

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.5 Implement biologically safe and appropriate control/management strategies, and where appropriate, eradication strategies to reduce the impacts and/or limit the distribution of invasive and/or non-native plant species within or near aquatic systems using methods that will provide the most protection to the aquatic and riparian ecological system, and minimize disturbance to the soil and wildlife. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.8.0.6 Implement long-term management of invasive and/or non-native plants to help maintain functioning ecological systems and biological diversity, and to enhance travel corridors. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.3 Restore and/or enhance habitats to benefit urban-associated SGCN.

2.10.0.4 Restore and/or enhance suitable travel corridors connecting conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.8 Protect significant natural and/or unique communities by implementing best management practices when conducting habitat restoration strategies.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.12 Create and/or maintain scrub-shrub habitats through revegetation efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.15 Restore and/or enhance terrestrial and aquatic habitats proximate to but not adjacent to roads and other transportation corridors for terrestrial-bound SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.10.0.21 Restore and/or enhance understory habitats that suppress invasive species and provide critical resources and enhance sheltering, foraging, and nesting cover for wildlife.

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.10.0.23 Restore and/or enhance roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

2.10.0.24 Use NJ's CHANJ mapping and guidance to establish vegetation and enhance or create corridors between fragmented habitats with similar vegetation, slope, soils, structure, etc. to ensure vegetative integrity is maintained to allow wildlife to safely disperse, and corridors are buffered with natural habitats to minimize disturbance to wildlife within the corridors.

2.10.0.25 Enhance SGCN fish habitats through aquatic and riparian vegetation restoration.

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.11.0.3 Create suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats through vegetation management.

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through vegetation management.

2.11.0.6 Reclaim degraded rare species habitats by conducting vegetation management needed to restore habitat value for the documented/target SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.8 Maintain, enhance and/or restore biologically appropriate buffers for SGCN-inhabited/used freshwater wetlands through vegetation management.

2.11.0.13 Implement best management practices (BMPs), protective strategies, and guidelines for vegetation management to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.11.0.14 Conduct vegetation management adjacent to roads for SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.11.0.15 Implement vegetation management to benefit urban-associated SGCN.

2.11.0.16 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.11.0.18 Implement forest management/silvicultural strategies that promote the development of new old-growth forests and/or minimize the loss of old-growth forest stands with large trees and within large, contiguous tracts.

2.11.0.20 Create and/or maintain scrub-shrub habitats through management efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.11.0.21 Minimize the degradation, alteration and/or changes in hydrology of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and subsequent disturbances to and behavioral changes of wildlife by maintaining or enhancing these areas and biologically appropriate buffers through habitat management and/or revegetation or restoration efforts.

2.11.0.23 Implement appropriate habitat management actions in areas where natural disturbances, such as wildfire, have been precluded.

2.11.0.24 Conduct vegetation management adjacent to aquatic habitats following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.25 Conduct vegetation management along access roads following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.26 Conduct vegetation management along roadsides and medians, avoiding peak activity periods for wildlife, that enhances wildlife dispersal naturally and safely across roads and similar barriers to/between terrestrial and/or aquatic habitats.

2.11.0.27 Conduct vegetation management for target shrub- or young forest-dependent SGCN following BMPs to minimize the risk of the establishment of invasive and non-native plants.

2.11.0.28 Conduct vegetation management in agricultural areas following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.29 Conduct vegetation management on transportation and service corridors (i.e., rights-of-way) following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.31 In areas where vegetative communities are shifting due to fire suppression and controlled burns are not feasible, manage vegetation to improve wildlife habitat.

2.11.0.32 Increase structural habitat diversity around and when feasible, within agricultural landscapes by managing vegetation for a variety of species, in particular, those farms that have removed scrub-shrub habitat and/or fragmented forests, and by implementing ecologically best practices (e.g., no-till farming, maintaining hedgerows, buffer set-asides, etc.).

2.11.0.33 Increase structural habitat diversity by implementing long-term vegetation management to minimize the potential for the establishment of invasive and/or non-native plants that may outcompete native vegetation.

2.11.0.34 Increase structural habitat diversity by managing residential, commercial and recreational areas' landscapes for a variety of species. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.35 Increase structural habitat diversity by managing vegetation adjacent to aquatic habitats in a manner that provides a buffer from runoff and erosion and a microclimate to stabilize seasonal temperatures to benefit a variety of aquatic and semi-aquatic species.

2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.

2.11.0.37 Increase structural habitat diversity by minimizing the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats which benefits wildlife.

2.11.0.38 Increase structural habitat diversity in and around horse/livestock farms by managing vegetation for a variety of species, in particular, in and around farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

2.11.0.39 Increase structural habitat diversity in and around solar farms by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.40 Increase structural habitat diversity surrounding areas used for energy, mining, and transportation and service corridors by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides, and avoid managing habitat during the breeding seasons for ground-nesting birds, reptiles, amphibians and small mammals.

2.11.0.41 Increase structural habitat diversity through the implementation of a variety of vegetation management practices such a prescribed burns (either increasing or decreasing their frequency depending on the site and objective), plantings, etc. that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.42 Increase structural habitat diversity within wind farms for terrestrial bound and low-flying species and around wind farms for other wildlife by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.43 Manage forests to increase variation in age structure and composition using BMPs that promote and maintain functioning ecological forest-based systems and biological diversity.

2.11.0.45 Regularly and/or rotationally create young forest habitat in targeted areas to maintain and regenerate a mosaic of upland forest habitats that will benefit shrub- and young forest-dependent species.

2.13 Wildlife damage management

2.13.0 Nuisance fish and wildlife damage

2.13.0.7 Develop, implement, monitor and evaluate management strategies to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

2.13.0.8 Implement and assess management strategies to control and reduce the impacts of detrimental species and diseases that pose threats to native wildlife or communities.

2.14 Wildlife disease management

2.14.0 Wildlife disease strategy development and investigation

2.14.0.1 Investigate diseases/pathogens impacting SGCN and/or their habitats.

2.14.0.2 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

2.14.0.3 Protect SGCN from exotic pathogen introduction or incident through implementation of a "rapid response plan"; DFW to give priority attention to these species in planning and/or implementing a response.

2.14.0.4 Conduct long-term monitoring of diseases in vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts.

2.14.0.5 Assess the impacts of diseases on the life cycles of wildlife.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.6 Conduct long-term studies on resident and migratory SGCN to determine if there are changes to the populations' demography (productivity, survival, dispersal) and/or to their critical and/or supporting habitats (i.e., diminishing in value, acreage or connectivity, etc.), in particular changes that would not maintain SGCN at viable levels for species populations. Update data and GIS maps; provide updated information to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.11 Develop, implement and evaluate the effectiveness of town plans that avoid impacts to SGCN species and their habitats.

3.0.0.12 Compile available life history information on urban-associated SGCN (e.g., predators, levels of nest/young depredation, breeding longevity and reproductive effort over time, preferred nesting/reproductive requirements, fidelity to breeding and wintering sites, comprehensive assessment of migration routes and destinations) for future development of management strategies to benefit such species.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.14 Identify areas with invasive, aquatic plants and animals and collect a detailed baseline assessment of the species' status and distribution. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort. Researchers and contractors performing Forest Stewardship Inventories and/or Plans on state lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.0.0.19 Identify the presence and status (e.g., functioning, structure, slated for removal, etc.) of existing dams and culverts within and/or that may impact SGCN and their habitats, and create a database that includes a GIS component identifying the locations of such structures and their status. Share this information with appropriate organizations and/or agencies evaluating the benefits and risks of such structures on SGCN and their habitats.

3.0.0.20 Once baseline data identifying and describing the status of existing dams and culverts have been gathered, conduct evaluations at a variety of sites to determine whether the benefits of culvert and dam creation or removal outweigh the risks to SGCN species and their habitats, and if other variables/conditions specific to individual sites/locations result in a different outcome. Identify and target appropriate dams and culverts for removal and/or reconstruction to minimize harm to SGCN species and their habitats.

3.0.0.23 Identify (through wildlife and aquatic system surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and research water quality parameters for all [types of] aquatic systems for various SGCN populations.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.2 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.0.4 Conduct long-term monitoring of the impacts of contaminants to vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.2.0.5 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

3.2.0.6 Develop, implement and conduct studies to evaluate the effectiveness of methods implemented to reduce road mortality of wildlife (e.g. wildlife underpasses, road closures).

3.2.0.7 Track (via a database that includes a GIS component) and research problematic species and diseases to determine their distribution, impacts on SGCN wildlife/wildlife communities, and develop potential control measures.

3.2.0.8 Implement and conduct long-term monitoring of control measures aimed at minimizing the impacts of problematic species and/or diseases to evaluate the effectiveness of such efforts and to identify and incorporate additional strategies as appropriate.

3.2.0.9 Maintain an inventory of invasive insect distribution and where they exist, conduct long-term monitoring of habitat conditions to assist in developing strategies to combat the impacts to SGCN habitats. Report potential infestations to NJ DEP.

3.2.0.10 Evaluate the effectiveness of sanitation/decontamination protocols in minimizing the transference of wildlife diseases and invasive plant species.

3.2.0.11 Investigate the impacts of ORV use as a mechanism to spread wildlife diseases and invasive plant species to native wildlife and habitats. Integrate this information when mapping undeveloped roads and trails to identify potentially sensitive areas in northern NJ forests.

3.2.0.12 Investigate the impacts of ORV use and ORV-created noise on terrestrial and aquatic wildlife behavior and the impact of direct mortality from vehicle strikes. Integrate this information when mapping undeveloped roads and trails to identify potentially sensitive areas in northern NJ forests.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.2 Age, size and sex structure

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.3 Baseline inventory

3.2.3.7 Identify roads or portions of roads, paved or unimproved (through site surveys, land use/land cover assessments and analyses, review of available data, enlistment of species experts, etc.) with high incidences of road mortality and/or presence of snakes, turtles, medium-sized and large mammals. Conduct assessments of the roads and incorporate information into a database that includes descriptions (e.g., qualifiers to help prioritize the roads' risk to wildlife) and a GIS component of the locations of such areas. Share this information with appropriate organizations and/or agencies working to implement measures (e.g., wildlife passages, road closures) to minimize the risk to these species.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.6 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) that could, through revegetation and/or enhancement efforts, become suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN.

3.3.1.7 Map and prioritize existing and potential areas for early succession forest management. Share the results with state, county and municipal planners.

3.3.1.8 Assess the availability and suitability of forest habitats for SGCN species (particularly reptiles and amphibians, birds, pollinators, and tiger beetles) in southern forests since Superstorm Sandy.

3.3.1.16 Gather "best information" for spatial modeling and update/create a current model/depiction of anticipated habitat shifts from sea-level rise, flooding, etc.

3.3.1.17 Identify and map undeveloped roads and trails in all conserved forests, and create a database of locations. Integrate information regarding potentially sensitive areas.

3.3.1.18 Conduct an assessment using available data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels.

3.3.1.19 Identify and codify legal ORV access areas on state (and if appropriate, other conserved) lands. Provide GIS mapping to the landowner for potential use in directing such recreational activities.

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.2 Monitoring

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.8 Evaluate the effectiveness of current prescribed burning practices on Pinelands dependent species.

3.3.2.9 Investigate the effectiveness of various silviculture techniques for enhancing forests for forest-dependent SGCN.

3.3.2.10 Evaluate the efficacy and success of different management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.3.2.11 Evaluate and compare the effectiveness of delayed mowing of warm season grass fields versus cool season hay fields to benefit grassland-dependent species.

3.3.2.12 Evaluate and compare the effectiveness of different management techniques (e.g., prescribed burning, mowing, brush-hogging, etc.) for maintaining suitable habitat for grassland-dependent species and species dependent upon early successional habitats.

3.3.2.13 Evaluate the effectiveness of management strategies (e.g., timing restrictions for mowing, cooperative agreements with utility companies for maintenance of rights-of-ways) that maintain and enhance large existing areas of grassland in perpetuity. Focus on habitat patches that can be managed to enhance the total size of suitable grassland habitat and create interspersed early-successional habitat.

3.3.2.14 Research and evaluate the effectiveness of water quality management practices on water-dependent and semi-dependent SGCN, particularly those practices associated with permitting or mitigation actions.

3.3.2.15 Investigate the effectiveness of management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.3 Develop/improve management techniques that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.8 Develop best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5.3.9 Develop strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.14 Develop aquaculture practices in the coastal areas that are compatible with the recovery of SGCN.

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.3.16 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.3.19 Work with foresters to develop prescribed burning practices for Pinelands dependent species that increase or maintain habitat quality for these species in the Pinelands.

3.5.3.20 Develop guidance on various silviculture techniques for enhancing forests for forest-dependent SGCN.

3.5.3.21 Develop management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.22 Identify (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) and modify management strategies (e.g., timing restrictions for mowing, cooperative agreements with utility companies for maintenance of rights-of-ways), based on research, that maintain and enhance large existing areas of grassland in perpetuity.

3.5.3.24 Based on research, modify management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.2 Develop, implement, monitor and evaluate management strategies to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

3.5.4.5 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

3.5.4.9 Conduct studies to evaluate the impacts of roads on SGCN and develop, implement and conduct studies to evaluate the effectiveness of methods to reduce road mortality of wildlife (e.g. wildlife underpasses, road closures).

3.5.4.13 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.17 Investigate new, non-invasive techniques for SGCN population evaluation through literature review, expert opinion, trial studies (if low risk), etc.

3.5.4.18 Investigate the effectiveness of survey techniques through selected “ground truthing” and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

3.5.4.21 Develop BMPs to address problematic species and diseases of unknown origin.

3.5.4.22 Investigate the efficacy of implementing strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities.

4 Education

4.1 Educator/Instructor training

4.1.0 Public education

4.1.0.1 Provide educational resources and training programs to private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

5 Facilities and Areas

5.15 Wildlife Management Areas

5.15.6 Roads

5.15.6.1 Clearly post areas/roads where vehicle access is permitted.

5.15.6.2 Clearly post areas/trails where vehicle access is not permitted.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.1 Enhance and increase the effective size of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates by securing adjacent habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.3 Secure and protect riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.4 Secure and protect fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.5 Secure and protect critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.6 Secure and protect old-growth forest stands with large trees and/or stands that are approaching or being actively managed for old growth forests, in particular those within large, contiguous forest tracts, through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.7 Secure and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.8 Secure and protect scrub-shrub habitats for SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.1 Promote the protection of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates and enhance these lands by increasing the effective size through conservation area designations of stopover habitats and adjacent private lands.

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.3 Increase the protection of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through conservation area designations.

6.3.0.5 Promote the protection of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through conservation area designations.

6.3.0.6 Promote the protection of old-growth forest stands with large trees and/or stands that are approaching or being actively managed for old growth forests, in particular those within large, contiguous forest tracts, through conservation area designations.

6.3.0.7 Promote the protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through conservation area designations.

6.3.0.8 Promote the protection of scrub-shrub habitats for SGCN through conservation area designations.

6.4 Private lands agreements

6.4.0 Private land agreement strategies

6.4.0.1 Enter into private lands agreements to expand control burns on private lands, in particular those adjacent to conserved lands to improve SGCN habitats.

7 Law Enforcement

7.1 Law enforcement

7.1.3 Sub-national Level

7.1.3.2 Increase the number of law enforcement officers tending to wildlife issues to a reasonable number to sufficiently cover the State and marine waters.

7.1.4 Scale Unspecified

7.1.4.1 Improve enforcement of policies and/or regulations that promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

7.1.4.5 Enforce current policies and/or regulations to increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal SGCN, and implement and enforce amended policies/regulations.

7.1.4.6 Recruit law enforcement to assist in the protection and enhancement of SGCN populations, in particular endangered species, through improved awareness of species through trainings, partnerships, and other methods. Information should include but is not limited to: 1) Issues concerning illegal collection of reptiles, 2) Persecution of rare snakes, 3) Illegal recreational activities on public lands (e.g., off-road vehicles) and their impact on wildlife, 4) Identification of sensitive areas, critical sites and/or "hot-spots" for collection.

7.1.4.7 Increase law enforcement presence to enforce regulations governing recreational activities (e.g., the use of personal watercraft and off road vehicles, caving, rock climbing, etc.) on conserved lands and within other sensitive habitats, and discourage activities that cause harm or disturbance to vegetation, wetlands, fish and wildlife.

7.1.4.8 Implement policies that protect critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates.

7.1.4.9 Implement policies that improve and secure habitat connections between conserved SGCN habitats.

7.1.4.10 Implement policies that promotes expanding acreages and enhances the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

7.1.4.11 Implement and enforce policies/regulations that will increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.14 Implement policies that protect existing and developing old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

7.1.4.15 Implement policies that preserve and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

7.1.4.16 Implement policies that protect and restore riparian areas.

7.1.4.17 Improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

7.1.4.19 Implement policies that protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

7.1.4.23 Implement policies that minimize wildlife road mortality.

7.1.4.24 Implement protective measures to benefit urban-associated SGCN such as restricting human access, buffering sensitive areas with postings, noise and/or light restrictions in sensitive areas and/or during sensitive periods such as breeding, etc.

7.1.4.26 Educate law enforcement personnel that there may be unauthorized research projects taking place and to encourage them to investigate any activities that appear to be harmful to wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.2 Develop a team of personnel from government entities, conservation organizations and other stakeholders engaged in oil/gas spill response for marine and freshwater habitats to develop a feasible plan for oil spill response and/or to amend NJ's current oil spill response plan that clearly outlines each organizations responsibilities and an assessment and location list of available equipment for boom deployment during oil spills.

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.1.0.4 Engage government agencies, conservation partners and other stakeholders in constructive dialogues encouraging them to influence policy change and the creation of incentives through a habitat bill and/or municipal ordinances for backyard habitat.

8.1.0.13 Engage DOD in a constructive dialogue regarding strategies to minimize disturbances to all SGCN (i.e., beyond their federal requirements) from forest management and other practices on their lands.

8.1.0.14 Engage DOD in a constructive dialogue regarding strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities.

8.1.0.15 Engage government agencies, conservation partners and other stakeholders in discussions encouraging and supporting the creation of laws and policies requiring vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

8.1.0.16 Engage local governments in discussions regarding the importance of them adopting/passing ordinances which require assessing and addressing secondary impacts (i.e., ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

8.1.0.17 Engage municipalities in constructive dialogue to identify and minimize destruction of areas prioritized for early succession forest management.

8.1.0.18 Engage NJDOT, NJ Transit Authority and other road management entities, wildlife conservation organizations/agencies (e.g., Division of Fish and Wildlife, New Jersey Conservation Foundation, Conserve Wildlife Foundation of NJ), and communities and citizens in discussions regarding the importance of and methods to enhance habitat connectivity, and work together to develop feasible strategies for ensuring that wildlife can disperse naturally and safely across roads and similar barriers to terrestrial and/or aquatic habitats.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.21 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation human-subsidized and/or overabundant, native species cause to local nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.22 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation invasive species cause to native nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.26 Coordinate across federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to woodland landowners to adopt or endorse consistent best management practices concerning controlled burns to maintain and/or improve forested habitat for wildlife.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.33 Engage government agencies, conservation partners and other land managers, communities, landowners, and commercial and industrial stakeholders in discussions regarding the importance of protecting and methods to protect priority wetlands beyond the levels afforded through regulation by maintaining and/or restoring optimal biological buffers around wetlands.

8.1.0.34 Work with the NJ Education Association and Department of Education to design curriculum and outdoor experimental learning opportunities, and provide training to teachers on implementation of these activities.

8.1.0.35 Promote backyard habitat management to create and/or enhance food availability for migratory species (birds, bats, invertebrates) on private lands.

8.1.0.37 Enlist landowners and NJ citizens in the protection of and survey efforts for SGCN, in particular rare species, by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management and wildlife-related volunteer programs.

8.1.0.38 Engage partners, stakeholders and land managers in constructive dialogue promoting forest stewardship for SGCN that use core forests and forested corridors.

8.1.0.40 Encourage researchers, land managers, naturalists and enthusiasts to follow proper procedures for the coordination and/or permitting of research/management activities involving wildlife and sensitive habitats, and discourage activities that alter vegetation or wetlands, or cause harm or disturbance to wildlife.

8.1.0.42 Engage citizens, wildlife observers and photographers through discussions and distributable information regarding the importance of and encouraging implementing responsible and ethical behavior when observing wildlife by developing an alliance of wildlife photographers and widely circulating recommendations on how to reduce impact.

8.1.0.44 Engage conservation partners, stakeholders, government agencies and other land stewards in constructive dialogues encouraging their inclusion of controlled burns in forest and other stewardship plans.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.7 Develop and provide (or otherwise make publicly available) educational programs and/or materials that describe the negative impacts of off-road vehicles and watercraft use in and adjacent to critical SGCN habitats, and the importance of confining such activities to more appropriate locations and/or seasons.

8.3.0.8 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate recreationists and encourage landowners to eliminate garbage in the vicinity of suitable wildlife habitat, in particular SGCN habitat. Information should include the detrimental impacts garbage may have on various wildlife species.

8.3.0.9 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners and land managers to include only native plants in landscaping and restoration projects. Provide information to assist them in detecting problematic establishment of invasive, non-indigenous plants.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.19 Develop an educational outreach program for the public on the devastating effects predators can have on native nesting wildlife.

8.3.0.21 Develop an educational outreach program for the general public, in particular those within and adjacent to coastal and riparian areas on the realities of sea-level rise to help citizens living in these areas understand how this will affect them, how coastal stabilization negatively impacts wildlife by preventing natural processes, and how their decisions impact species.

8.3.0.22 Post signage in sensitive coastal habitats (e.g., bird and Diamondback Terrapin nesting areas) to educate the boating community on responsible use of these areas.

8.3.0.24 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

8.3.0.25 Develop educational outreach programs for landowners, nurseries and the general public regarding the negative impacts of invasive and non-native plants on our natural communities.

8.3.0.26 Develop educational outreach programs for private and public landowners and land managers regarding the importance of and how to manage core forests and forested corridors in a way that will be beneficial for SGCN, particularly endangered, threatened and special concern species.

8.3.0.27 Develop educational outreach programs for public and private landowners and land managers regarding the importance of structural habitat diversity, methods to increase diversity, and/or incentive programs available to increase habitat diversity.

8.3.0.28 Develop educational outreach programs for public and private landowners and land managers regarding the importance of managing grasslands for grassland-dependent species, methods of management, and/or incentive programs available.

8.3.0.29 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about the importance of maintaining a vegetative buffer along riparian and aquatic habitats to intercept storm water runoff and minimize soil erosion.

8.3.0.30 Develop educational outreach programs for private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.4 Develop a plan that directs the creation of new impoundments and/or the expansion of bogs for cranberry farming within or immediately adjacent to critical forested habitats in a manner that minimizes impacts on the natural hydrology of the watershed and subsequently, the natural wetlands in the area.

9.1.0.5 Develop a plan that directs the creation or expansion of energy or utility rights-of-way in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.6 Develop a plan that directs the creation or expansion of roads and railroads or the re-establishment of abandoned railroads within and adjacent to critical forested habitats in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.7 Develop a plan that directs the maintenance of or new channelization of forested streams and rivers in a manner that minimizes impacts of the aquatic ecological system and adjacent forest

9.1.0.8 Develop a plan that focuses on strategies for oil pipelines to avoid sensitive habitats that would be highly impacted by oil spills.

9.1.0.9 Develop a plan that focuses on strategies to minimize the creation of renewable energy farms (e.g., solar, wind) and related infrastructures within and their impacts on forested habitats and the wildlife community.

9.1.0.10 Develop a plan that focuses on strategies to minimize the impacts of mining on critical forested habitats.

9.1.0.11 Develop a plan that focuses on strategies to minimize the impacts of power plants on critical forested habitats and the wildlife community.

9.1.0.15 Develop a plan to minimize fragmentation of terrestrial and aquatic habitats by roads.

9.1.0.16 Develop a plan to minimize new lawnscapes and preserve natural vegetation within and adjacent to critical forest areas.

9.1.0.18 Develop a plan to minimize the effects of road widening and traffic volume increases within critical wildlife habitat areas using CHANJ products.

9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

9.1.0.20 Develop a plan to minimize the impacts of existing agricultural properties adjacent to and the conversion of forest habitats (terrestrial and aquatic, within or adjacent to critical forests) to agriculture, grazing areas/livestock farms, and plantations.

9.1.0.21 Develop a plan to minimize the use of any-sized dam in critical forested areas.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.23 Develop a plan to mitigate the effects of transportation barriers by using CHANJ products.

9.1.0.24 Develop a plan to prevent livestock from entering water bodies in critical forested habitats.

9.1.0.25 Develop a plan to prevent the conversion of forested stream buffers to pastures in critical forested habitats.

9.1.0.27 Develop a plan to use wildlife-appropriate culverts in critical forested areas.

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.31 Develop wetland restoration plans that consider the life history and needs of wildlife occupying targeted habitats.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.2 Organizational strategic and CMS planning

9.2.1 Organizational strategic and operational planning

9.2.1.1 Identify and codify legal ORV access areas on state lands.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.5 Develop response plans to address disease outbreaks within wildlife populations, in particular SGCN.

9.3.1.6 Amend NJ's current oil spill response plan to 1) expand the geographic area addressed, 2) expand the targeted species impacted and in need of recovery, and 3) revise current and integrate new actions into the plan as needed.

9.3.1.7 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.10 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.1.12 Develop a management plan to benefit urban-associated SGCN based on research.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.14 Create species management plans that will promote the protection and where appropriate, the development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

9.3.1.15 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.1.16 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.1.20 Use compiled life history information on urban-associated SGCN regarding threats, breeding, fecundity, survival, habitat needs, wintering sites/roosts, migration routes and destinations, etc. to develop wildlife management strategies to benefit such species.

9.3.3 Habitat management planning

9.3.3.6 Develop a management plan for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

9.3.3.7 Develop a management plan to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

9.3.3.8 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.3.9 Develop a response plan to outbreaks using BMPs to control infestations and limit their spread in a way that avoids excessive harm to non-target species.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.16 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.3.17 Develop a management plan for prescribed burning that will benefit Pinelands dependent species and increase or maintain habitat quality for these species in the Pinelands.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.21 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.3.22 Create management plans to minimize and/or prevent wildlife road mortality that will incorporate wildlife passages in conjunction with barrier fencing and, where possible, seasonal closures. Aquatic-associated passages must avoid disturbance to the natural streambeds and riparian habitat, permit high volumes of water to flow freely, and provide adequate travel corridors for terrestrial wildlife, while maintaining stream flow for fish passage. Bridges that span rivers and streambeds and include floodplain habitat on either side of the span to provide travel corridors for terrestrial wildlife are preferred over culverts.

9.3.3.23 Create forest management plans that will promote the protection and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

9.3.3.24 Develop a plan to improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

9.3.3.26 Develop a management plan for parcels of suitable size to be managed for native herbaceous plant species that support breeding grassland dependent species.

9.3.3.28 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.3.29 Develop habitat management plans aimed at reducing or eliminating negative impacts of ORVs.

9.3.3.32 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3.34 Include controlled burn prescriptions in forest and stewardship plans to improve wildlife habitat.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

9.3.3.38 Use compiled life history information on urban-associated SGCN regarding threats, breeding, fecundity, survival, habitat needs, wintering sites/roosts, migration routes and destinations, etc. to develop habitat management strategies to benefit such species.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.3 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.9 Review strategies for creating or enhancing connectivity (e.g., installing appropriately-sized wildlife passages) between wetlands to allow wildlife to disperse naturally and safely.

11.1.1.10 Use CHANJ mapping in reviews of proposed energy, mining, transportation and utility service companies/agencies' projects to attempt to maintain habitat connectivity and reduce fragmentation, and identify potential impacts of the projects.

11.1.1.11 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed offshore energy projects relating to drilling, extraction and distribution of petroleum and gas products to reduce habitat destruction and minimize impacts on wildlife.

11.1.1.12 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed solar farm projects to reduce habitat fragmentation and minimize impacts on wildlife.

11.1.1.13 Use the best available science (species data, habitat present, wind farm layout options, wind blade impacts on migratory species, location of migration routes, etc.) when conducting regulatory reviews of proposed wind farm projects to minimize impacts on migratory and resident wildlife and reduce habitat fragmentation.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.2.2 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.2.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into the environmental review process to help establish policies and plans that minimize the impact of aquaculture on fish and wildlife.

11.1.2.4 Review strategies for creating or enhancing connectivity (e.g., installing appropriately-sized wildlife passages) between wetlands to allow wildlife to disperse naturally and safely.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.2 Provide technical support to public and private landowners and land managers for controlling invasive, native and non-native plant species in order to increase structural habitat diversity.

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.7 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on the importance of maintaining habitat connectivity, minimizing fragmentation, and the use of CHANJ products to help them target areas for such planning.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.11 Provide educational resources, training programs, and on-the-ground guidance to private and public landowners and land managers on the benefits of and for creating young forest and early succession habitat for SGCN.

11.2.0.12 Provide educational resources and technical support to public landowners and land managers for managing grasslands for grassland-dependent species.

11.2.0.13 Provide educational resources and technical support to public landowners, private landowners with sufficient acreage, and land managers to promote the protection and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

11.2.0.14 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters), and to enhance or restore biologically appropriate buffers.

11.2.0.15 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and landowners about the importance of retaining and in an effort to protect, create, enhance and/or restore vegetation along aquatic habitats.

11.2.0.16 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

11.2.0.19 Provide educational resources and technical support to public and private landowners and land managers to promote the protection and/or enhancement of scrub-shrub habitats for SGCN.

11.2.0.20 Provide educational resources and technical support to public and private landowners and land managers to promote the protection and/or enhancement of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN.

11.2.0.21 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates to promote the protection and/or enhancement of those adjacent habitats to increase the effective size of the migratory habitat.

11.2.0.22 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

11.2.0.23 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to SGCN habitats to promote the protection and/or enhancement of those adjacent habitats to increase the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and that connect conserved SGCN habitats.

11.2.0.24 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers on how to manage vegetated roadside areas (e.g., mowing, brush-hogging, etc.) on a schedule that avoids peak activity periods for wildlife and therefore, minimizes harm.

11.2.0.25 Provide educational resources, training programs, and on-the-ground guidance to resource managers regarding the assessment of and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) related to residential and commercial development.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.1 Engage partners and stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.3 Provide educational resources, training programs, and on-the-ground guidance to DOD to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop and implement forest management and other practices that minimize disturbances to SGCN (i.e., beyond their federal requirements).

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

11.2.2 With private landowners

11.2.2.1 Provide technical support to farming operations and woodland landowners on ways to decrease clean farming (edge-to-edge) practices and create ecotones to benefit bobwhite and other species dependent on early successional habitat.

100 Law and Policy

100. Legislation

100.1.2 National Level

100.1.2.1 Create legislation to establish markets for warm-season grasses to increase the permanency of this crop on the landscape.

100.1.3 Sub-national Level

100.1.3.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.3.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.4 County and Local

100.1.4.1 Enhance critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates through the local ordinances of adjacent private lands to increase the effective size of the habitat.

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.3 Expand the acreages and enhance the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN through local ordinances.

100.1.4.4 Secure wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and biologically appropriate buffers through local ordinances.

100.1.4.5 Secure SGCN-inhabited/used freshwater wetlands and biologically appropriate buffers through local ordinances.

100.1.4.8 Secure critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through local ordinances.

100.1.4.9 Secure existing and developing old-growth forest stands with large trees, in particular those within large, contiguous forest tracts, through local ordinances.

100.1.4.10 Secure critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through local ordinances.

100.1.4.11 Secure riparian areas through local ordinances.

100.1.4.12 Secure scrub-shrub habitats for SGCN through local ordinances.

100.1.4.13 Encourage municipal laws regulating domestic pets that may predate on wildlife.

100.1.4.14 Adopt/pass local ordinances which require assessing and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.5.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.5.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into state/local policy to minimize the impact of aquaculture on fish and wildlife.

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.1 Develop (and/or improve) policies and/or regulations that will promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

100.3.0.3 Develop policies that will promote the long term protection of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates.

100.3.0.5 Develop policies that will promote improved and secure habitat connections between conserved SGCN habitats.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.7 Amend current policies and/or regulations to increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.11 Develop policies that will ensure the protection and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

100.3.0.12 Develop policies that promote the preservation and protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.13 Develop policies that will promote protecting and restoring riparian areas.

100.3.0.14 Develop policies and/or regulations that increase the protective buffers of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) to biologically appropriate distances to benefit SGCN that rely upon these habitats and improve the function of the [associated] aquatic systems.

100.3.0.15 Develop policies that promote protecting and restoring scrub-shrub habitats to benefit shrub-dependent SGCN.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.20 Develop policies and/or regulations that prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

100.3.0.21 Develop policies that minimize wildlife road mortality through: 1) Requiring the integration of wildlife passages into all new and repaired roads, in particular those areas that will connect SGCN habitats, 2) Requiring current fish/wildlife passages be improved and maintained in perpetuity, 3) Supporting seasonal road closures, in particular for unimproved roads, 4) Supporting projects that work to improve connectivity of SGCN habitats such as land conservation through acquisition or other means.

100.3.0.26 Adopt regulations requiring the combined sewer overflow alternative analyses required by regulation address potential impacts to wildlife in watercourses or receiving water bodies.

100.3.0.31 Create or expand tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMPs.

100.3.0.40 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.45 Increase the controlled burn season to focus on restoring vegetative communities.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.48 Propose new State law or regulation mandating that a State-level "development impact fee" be assessed on all new development approved by municipalities (via the Municipal Land Use Law processes), and dedicate such monies to the development and implementation of regional Habitat Conservation Plans (or existing plans/programs serving the same regional function).

100.3.0.49 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address the issue of disturbance to habitat or species as a result of human activities (e.g., construction, bridge maintenance, road work, etc.).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.53 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded rights-of-way corridors associated with energy transport/transmission.

100.3.0.54 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded surface mining areas.

100.3.0.56 Develop regulations that when implemented will protect critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates.

100.3.0.57 Develop regulations that when implemented will improve and secure habitat connections between conserved SGCN habitats.

100.3.0.58 Develop regulations that when implemented will promote the expansion of acreages and enhancement of the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.59 Develop regulations that when implemented will increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.62 Develop regulations that when implemented will protect existing old-growth forest stands with large trees and/or stands that are being actively managed for old growth forests, in particular those within large, contiguous forest tracts.

100.3.0.63 Develop regulations that when implemented will preserve and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.64 Develop regulations that when implemented will protect and restore riparian areas.

100.3.0.65 Develop regulations that when implemented will protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

100.3.0.68 Develop regulations that when implemented will prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

100.3.0.69 Develop regulations that when implemented will minimize wildlife road mortality.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100.3.0.73 Develop regulations that would exempt the conversion of lawns to native vegetation (beneficial to wildlife) from local lawn ordinances.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.2 Create a policy that requires the NJ DEP to incorporate scientific information regarding climate change and sea level rise (e.g., predictions, habitat management/acquisition efforts to enhance resilience to inundation) on their websites and to work with other government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

100.4.0.3 Develop policies for mandatory buffer strips on preserved farmlands and state-owned agricultural lands.

100.4.0.4 Create a policy that requires the use of wildlife habitat and corridor mapping products for both regulatory use when conducting project reviews and planning/siting new or expanded rights-of-way projects.

100.4.0.8 Develop a white paper addressing the impacts that existing, new or expanded rights-of-way have upon wildlife, wildlife habitats and habitat connectivity.

100.4.0.9 Develop and implement policies to minimize the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats in order to benefit wildlife.

100.4.0.12 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.4.0.13 Develop policies for different circumstances (e.g., roadsides and medians, riparian, aquatic and terrestrial habitats) that outline appropriate habitat/vegetation management strategies and schedules to minimize risks to and benefit wildlife.

100.4.0.14 Develop policies to facilitate agreements between eligible entities to manage appropriate conserved lands for grassland-dependent species, and to have access to/obtain restoration funds.

100.4.0.16 Develop policies to implement habitat management strategies that will increase the structural diversity surrounding areas used for energy, mining, and transportation and service corridors which include but are not limited to the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-

100.4.0.17 Develop policies to implement habitat management strategies, including prescribed burns, that will increase the structural diversity on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies to control and reduce the impacts of invasive, non-native species in order to increase structural habitat diversity.

100.4.0.18 Develop policies to minimize the extent of infrastructure associated with energy and service corridors or areas (e.g., wind and solar farms, pipelines, utility lines) and that require the implementation of habitat management strategies that will increase the structural diversity in the area including (e.g., the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides).

100.4.0.19 Develop regulations that will minimize the creation of new barriers, remove or replace current barriers with appropriately-sized systems to accommodate wildlife dispersal, and to minimize road widening and traffic volume increases within critical wildlife habitat areas.

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.22 Work with NJ DEP's Division of Land Use Regulation to ensure protection of listed species and their habitats during stream cleaning events.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Eastern Hognose Snake

Focal species that comprise this Conservation Target:

Eastern Hognose Snake

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:

1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.1.1.2 Loss, alteration and/or degradation of habitat.

1.1.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.

1.1.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.

1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:

1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.2.1.2 Loss, alteration and/or degradation of habitat.

1.2.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.

1.2.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.

1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats:

1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.3.1.2 Loss, alteration and/or degradation of habitat.

1.3.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.

1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture (Avg. Score: 2.00)

NJ Specific Threats:

2.1.1.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.2 Small-holder Farming (Avg. Score: 1.00)

NJ Specific Threats:
- 2.1.2.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.
- 2.1.2.2 Fragments terrestrial and aquatic habitats.
- 2.1.2.4 Agricultural practices (e.g., mechanized, row-crop agriculture) can cause direct mortality to wildlife when harvesting takes places.

2.1.3 Agro-industry (Avg. Score: 2.00)

NJ Specific Threats:
- 2.1.3.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.
- 2.1.3.2 Fragments terrestrial and aquatic habitats.
- 2.1.3.3 Agricultural practices (e.g., mechanized, row-crop agriculture) can render lands unsuitable for most wildlife due to soil degradation and erosion.

2.2 Wood and Pulp Plantations

2.2.1 Small Holder (Avg. Score: 2.00)

NJ Specific Threats:
- 2.2.1.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.
- 2.2.1.2 Tree harvesting can cause direct mortality to wildlife, especially if done during peak activity periods or vulnerable life stages (e.g., denning, nesting, gestation/birthing, basking, roosting, pre-volancy, etc.).

2.2.2 Agro-industry Plantations (Avg. Score: 2.00)

NJ Specific Threats:
- 2.2.2.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.
- 2.2.2.2 Tree harvesting can cause direct mortality to wildlife, especially if done during peak activity periods or vulnerable life stages (e.g., denning, nesting, gestation/birthing, basking, roosting, pre-volancy, etc.).

2.3 Livestock Farming and Ranching

2.3.2 Small-holder Grazing (Avg. Score: 1.00)

NJ Specific Threats:
- 2.3.2.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.3 Agro-industry Grazing (Avg. Score: 2.00)

NJ Specific Threats:
- 2.3.3.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

3 Energy Production and Mining

3.1 Oil and Gas Facilities and Pipelines

3.1.1 Distribution processes of petroleum and other liquid hydrocarbons (Avg. Score: 2.00)

NJ Specific Threats:
- 3.1.1.1 Fragments terrestrial and aquatic habitats.
- 3.1.1.2 Loss, alteration and/or degradation of habitat.
- 3.1.1.3 Increased risk of oil spills.
- 3.1.1.4 Increased noise pollution.
- 3.1.1.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.
- 3.1.1.6 Increased risk of collision between marine mammals, sea turtles and fish and the marine-based structures/facilities.

3.1.2 Natural gas distribution processes (Avg. Score: 2.00)

NJ Specific Threats:
- 3.1.2.1 Fragments terrestrial and aquatic habitats.
- 3.1.2.2 Loss, alteration and/or degradation of habitat.
- 3.1.2.3 Increased risk of gas leaks and explosions.
- 3.1.2.4 Increased noise pollution.
- 3.1.2.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.
- 3.1.2.6 Increased risk of collision between marine mammals, sea turtles and fish and the marine-based structures/facilities.

3.2 Mining and Quarrying

3.2.2 Surface Mining - Rock Quarry (and sand quarries) (Avg. Score: 2.00)

NJ Specific Threats:
- 3.2.2.1 Fragments terrestrial and aquatic habitats.
- 3.2.2.2 Loss, alteration and/or degradation of terrestrial and aquatic habitats.
- 3.2.2.3 Increased risk of vehicle strikes/mortality to wildlife.

3.3 Renewable Energy

3.3.1 Wind Power (Avg. Score: 2.00)

NJ Specific Threats:
- 3.3.1.2 Fragments terrestrial habitats.
- 3.3.1.3 Loss, alteration and/or degradation of habitat.
- 3.3.1.4 Increased commercial infrastructure.

3.3.2 Solar Power (Avg. Score: 3.00)

NJ Specific Threats:
- 3.3.2.1 Fragments terrestrial habitats.
- 3.3.2.2 Loss, alteration and/or degradation of habitat.
- 3.3.2.3 Increased commercial infrastructure.

3.4 Conventional Power Plants

3.4.0 Conventional Power Plants (Avg. Score: 1.00)

NJ Specific Threats:
- 3.4.0.2 Loss, alteration and/or degradation of habitat due to new or the expansion of current facilities.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:
- 4.1.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species and inhibiting dispersal of non-volant animals, reducing gene flow.
- 4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.
- 4.1.1.3 Re-establishment of abandoned railroad lines may displace wildlife, in particular, less mobile species using the area to fulfill critical life history requirements.
- 4.1.1.4 Re-establishment of abandoned railroad lines may increase the risk of direct mortality on wildlife.

4.1.2 Movement of cars and other vehicles on roads and railroads (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats: 4.1.2.1 Increased vehicle traffic increases the risk of wildlife mortality from strikes.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads (Avg. Score: 2.00)

NJ Specific Threats: 4.2.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species, inhibiting dispersal of non-volant animals, reducing gene flow, and creating barriers to fish when service line-associated roads cross streams (e.g., bridges, culverts, fords, etc.).

4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

4.2.2 Management of rights-of-way or communication tower facilities and/or their associated access roads (Avg. Score: 2.00)

NJ Specific Threats: 4.2.2.1 Improper or poorly scheduled vegetation management can cause direct mortality to and may reduce productivity of wildlife.

5 Biological Resource Use

5.1 Hunting and Collecting Terrestrial Animals

5.1.1 Intentional Use (Avg. Score: 2.00)

NJ Specific Threats: 5.1.1.1 Illegal collection of wildlife can have detrimental impacts on populations.

5.1.3 Persecution/Control (Avg. Score: 3.00)

NJ Specific Threats: 5.1.3.1 Wanton killing of perceived dangerous and/or undesirable animals.

5.2 Gathering Terrestrial Plants

5.2.2 Unintentional effects (Avg. Score: 1.00)

NJ Specific Threats: 5.2.2.1 Stepping on nests or young/hatchling animals.

5.3 Logging and Wood Harvesting

5.3.1 Intentional Use (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.1.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.1.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.1.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.2 Intentional Use (large scale) (Avg. Score: 2.00)

NJ Specific Threats: 5.3.2.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.2.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.2.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.3 Unintentional effects (subsistence/small scale) (Avg. Score: 2.00)

NJ Specific Threats: 5.3.3.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4 Unintentional effects (large scale) (Avg. Score: 2.00)

NJ Specific Threats:
- 5.3.4.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.
- 5.3.4.2 Extensive infrastructure and larger equipment requirements present a potential risk of direct injury/mortality to wildlife.
- 5.3.4.5 Lack of appropriate, sustainable forest management can lead to a decrease in forest habitat diversity, degraded habitat for many forest species, the loss of habitat for early-successional species, and/or the loss of unique habitats for species that need canopy breaks and multi-aged tree composition to fulfill various life history requirements.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized) (Avg. Score: 2.00)

NJ Specific Threats:
- 6.1.1.1 Inappropriate use of off-road vehicles creates new roads/trails which fragments habitat.
- 6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.
- 6.1.1.3 Increased risk of harassment that results in a change in wildlife behavior and/or direct mortality from vehicle strikes.
- 6.1.1.4 Increased noise pollution.
- 6.1.1.6 Off-road vehicles can be a mechanism of transference of wildlife diseases and invasive plant species if gear and apparel are not properly sanitized between sites.

6.1.5 Wildlife observation and photography (Avg. Score: 2.00)

NJ Specific Threats:
- 6.1.5.1 Improperly conducted recreational activities may disrupt normal wildlife behaviors which can result in reduced reproductive success or survival, abandonment of critical sites, etc.
- 6.1.5.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.1.6 Recreational use of cliffs, rocks and ridgelines (Avg. Score: 2.00)

NJ Specific Threats:
- 6.1.6.1 Recreational rock-climbing and rock-scrambling can cause reduced reproductive success or reproductive failure for wildlife by disrupting normal reproductive behaviors and/or reduce breeding success by forcing them into suboptimal habitats.
- 6.1.6.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.
- 6.1.6.3 Recreational use of rock outcrops and ridgelines by hikers and bikers can lead to direct mortality through wanton killing or incidental take, and alter natural behaviors, reducing breeding and/or foraging success.

6.1.7 Other (Avg. Score: 2.00)

NJ Specific Threats:
- 6.1.7.2 Human presence in sensitive areas may introduce wildlife diseases or pathogens into the system.

6.2 Military Exercises

6.2.1 Military exercises (Avg. Score: 2.00)

NJ Specific Threats:
- 6.2.1.1 Military testing and training exercises may inflict disturbance and potential physical harm to wildlife.
- 6.2.1.3 Lack of opportunity for non-federal wildlife managers to influence activities on military bases may result in detrimental impacts to SGCN and/or missed opportunities to engage in projects that benefit SGCN.

6.3 Work and Other Activities

6.3.1 Unauthorized research projects at significant habitats (Avg. Score: 2.00)

NJ Specific Threats: 6.3.1.1 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.1.2 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.1.3 Activities conducted without proper precautions may disturb and disrupt normal wildlife behaviors, which may impact reproductive success or survival, cause abandonment of critical sites, etc.

6.3.2 Authorized research projects at significant habitats (Avg. Score: 2.00)

NJ Specific Threats: 6.3.2.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.2.3 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.2.4 Activities conducted without proper precautions may disturb and disrupt normal wildlife behaviors, which may impact reproductive success or survival, cause abandonment of critical sites, etc.

6.3.3 Other "work" unrelated to research (Avg. Score: 1.00)

NJ Specific Threats: 6.3.3.1 Construction projects may disrupt normal wildlife behavior which can result in reduced reproductive success or survival, abandonment of critical sites, etc. (e.g., bridge-nesting birds).

6.3.3.4 Workers may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

7 Natural Systems Modifications

7.1 Fire and Fire Suppression

7.1.1 Increase in Fire Frequency/Intensity (Avg. Score: 2.00)

NJ Specific Threats: 7.1.1.1 Increase in frequency and intensity of wild fires as a result of droughts and heat waves drying out vegetation and litter.

7.1.1.2 Increase in frequency of wild fires as a result of illegal activities.

7.1.1.3 Unnatural fire regimes occurring as a result of military exercises.

7.1.1.4 Lack of diversity in age structure and composition of vegetation due to expansive, frequent fires.

7.1.2 Suppression of Fire Frequency/Intensity (Avg. Score: 3.00)

NJ Specific Threats: 7.1.2.1 Shift in vegetative communities as a result of suppression of natural fires.

7.1.2.2 Lack of diversity in age structure and composition of vegetation due to the suppression of fire.

7.2 Dams and Water Management/Use

7.2.12 Culverts (Avg. Score: 1.00)

NJ Specific Threats: 7.2.12.1 Improper design, placement, installation and maintenance of culverts and other stream crossing structures can impede or prevent the movements of terrestrial organisms and can restrict or limit stream flow, impeding the movement of aquatic organisms along riparian corridors.

7.3 Other Ecosystem Modifications

7.3.2 Inappropriate timing of mowing (Avg. Score: 2.00)

NJ Specific Threats: 7.3.2.1 Increased risk of direct mortality and/or reduced productivity of wildlife, as well as reduced use by migrating species.

7.3.3 Removal of coarse woody debris (streams, forests, scrub-shrub habitats) (Avg. Score: 2.00)

NJ Specific Threats: 7.3.3.2 Decreases habitat and/or corridor suitability due to limited or absent shelter and foraging habitat.

7.3.3.3 Removal of dead trees (snags), large felled logs (i.e., those > 12" dbh), and other downed woody material diminishes nesting, roosting, and sheltering options for wildlife, and increases the ease at which deer can browse regenerating vegetation.

7.3.3.4 Decreases available basking, shelter, and foraging habitats.

7.3.4 Lack of natural disturbance patterns or ecosystem functions due to species loss (Avg. Score: 1.00)

NJ Specific Threats: 7.3.4.5 The lack of forest disturbance minimizes the diversity of herbaceous vegetation and other shrubs and trees that need a lot of sunlight to grow.

7.3.5 Poor habitat management (Avg. Score: 3.00)

NJ Specific Threats: 7.3.5.1 Improper or poorly scheduled maintenance of man-made corridors (e.g., roadsides and medians) can cause direct mortality to and may reduce productivity of wildlife.

7.3.5.3 Vegetation clearing removes terrestrial and riparian corridors for animal movement, shelter, and resting areas.

7.3.5.5 Habitat management that alters or removes vegetation without implementing long-term management increases the risk of invasive and exotic plants establishing themselves, outcompeting native vegetation.

7.3.5.6 Habitat management, including that which occurs on public and private lands, that does not consider timing and species' behaviors can result in the direct mortality and/or alteration or loss of habitat.

7.3.5.7 Improperly planned habitat management and/or mitigation efforts along roadsides and within the medians can attract wildlife and increase the risk of vehicle strikes.

7.3.5.12 Lack of diversity in age structure and composition of vegetation due to lack of natural disturbances and/or vegetation management.

7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.1.1.1 Displace or outcompete native species for resources.

8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.

8.1.1.3 Invasive, non-native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

8.1.1.4 Invasive, non-native animals increase the risk of predation on native animals and/or herbivory on native vegetation.

8.1.1.5 Invasive, non-native animals and plants increase the risk of introduction and transference of diseases

8.1.1.6 Invasive, non-native plants may create physical barriers for some species.

8.1.4 Invasive non-native terrestrial/wetland animals (Avg. Score: 1.00)

NJ Specific Threats: 8.1.4.1 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.4.2 Free-roaming and feral domestic animals such as cats and dogs causes direct mortality of wildlife and disturbance to wildlife breeding and resting areas.

8.1.5 Invasive non-native terrestrial/wetland plants (Avg. Score: 1.00)

NJ Specific Threats: 8.1.5.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.6 Invasive non-native fungal/bacterial diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.1.6.1 The introduction of non-native fungal and bacterial diseases threatens native populations and ecosystems.

8.2 Problematic Native Species/Diseases

8.2.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.2.1.1 Overabundant native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

8.2.1.2 Invasive pathogens and insects may increase in range and abundance as limiting factors (such as temperature) are altered as a result of climate change.

8.2.1.4 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.2.2 Named Species (Avg. Score: 1.00)

NJ Specific Threats: 8.2.2.2 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.4 Problematic Species/Diseases of Unknown Origin

8.4.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.4.1.1 Non-native or poorly understood diseases and parasites could potentially impact native animals.

8.4.2 Named Species (Avg. Score: 2.00)

NJ Specific Threats: 8.4.2.2 Diseases of unknown origin, such as snake fungal disease and Ranavirus, can cause significant mortality among native animal populations.

8.5 Viral/Prion-induced Diseases

8.5.1 Unspecified Species (Disease) (Avg. Score: 1.00)

NJ Specific Threats: 8.5.1.1 There is a large knowledge gap regarding the existence of, or potential for, other diseases impacting native wildlife.

8.5.2 Named Species (Disease) (Avg. Score: 2.00)

NJ Specific Threats: 8.5.2.1 Diseases such as West Nile Virus, arenavirus, sudden oak death, Avian Influenza, and snake fungal disease cause morbidity or mortality to native populations.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.2 Industrial and Military Effluents

9.2.1 Oil Spills (Avg. Score: 1.00)

NJ Specific Threats: 9.2.1.1 Oil spills render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.1.2 Oil spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.1.3 Oil spills cause external oiling of wildlife and ingestion of oil, both of which can injure or kill wildlife.

9.2.3 Other (Avg. Score: 1.00)

NJ Specific Threats: 9.2.3.2 Chemical spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.3.3 Chemical spills may render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.4 Other: Hydrofracturing (Avg. Score: 1.00)

NJ Specific Threats: 9.2.4.2 Uncontrolled effluents escaping from hydrofracturing facilities can cause injury to wildlife and alter normal behaviors.

9.2.5 Other: Industrial toxic settling ponds (Avg. Score: 1.00)

NJ Specific Threats: 9.2.5.1 Surficial or open industrial effluent ponds can cause injury or death to wildlife that become exposed through ingestion or submersion.

9.3 Agricultural and Forestry Effluents

9.3.2 Soil Erosion and Sedimentation (Avg. Score: 1.00)

NJ Specific Threats: 9.3.2.2 Soil erosion and sedimentation limit the re-establishment of plants needed by terrestrial wildlife as cover and a food base.

9.3.3 Herbicides and Pesticides (Avg. Score: 1.00)

NJ Specific Threats: 9.3.3.2 Use of rodenticides can cause secondary actions of injury and death to animals in the course of scavenging.

9.3.3.3 Use of pesticides can directly harm non-target species through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture (Avg. Score: 1.00)

NJ Specific Threats: 9.3.5.1 Use of pesticides, insecticides, and/or herbicides can directly harm non-target species, such as amphibians and beneficial invertebrates through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5.4 Improper use of current insecticides, such as those containing esfenvalerate, prallethrin, or piperonyl butoxide, or past use of pesticides containing chlordane still present in the soils, are toxic to various wildlife species, and can cause injury, mortality, or other effects that impair population viability.

9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.4 Garbage and Solid Waste

9.4.1 Direct hazards to wildlife (Avg. Score: 1.00)

NJ Specific Threats: 9.4.1.1 Wildlife may ingest garbage causing choking or impingement in the digestive system, or they may become physically entangled in it (e.g., plastic or abandoned fish nets); conditions that make them unable to feed or drink, cause them to suffocate or drown, or otherwise restrict the animal's movement making them more susceptible to predators, starvation or injury.

9.4.1.2 Garbage and solid waste destroys natural habitats and obstructs wildlife movements.

9.5 Air-Bourne Pollutants

9.5.6 Herbicides and Pesticides (Avg. Score: 2.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

9.6 Excess Energy

9.6.3 Noise Pollution (Avg. Score: 1.00)

NJ Specific Threats: 9.6.3.1 Acute and chronic noise pollution in and adjacent to terrestrial and aquatic (marine and freshwater) environments could disrupt normal behaviors of wildlife such as migration, communication, feeding, eluding predators, resting and breeding, etc.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 1.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.3 Temperature Extremes

11.3.1 Temperature extremes (Avg. Score: 2.00)

NJ Specific Threats: 11.3.1.4 Extremely low temperatures and/or extensive periods of unseasonably low temperatures during critical life history stages (e.g., hibernation, gestation/nesting) can alter animals' behaviors and decrease survivorship.

11.4 Storms and Flooding

11.4.2 Increased rainfall (Avg. Score: 2.00)

NJ Specific Threats: 11.4.2.2 Extreme rain events can damage wildlife nesting and resting habitats, including impacts to avian eggs and chick and small mammal survivorship.

11.6 Phenology Shifting or Alteration

11.6.2 Phenology shifts related to predator-prey ecology (Avg. Score: 1.00)

NJ Specific Threats: 11.6.2.1 Alters inter-specific relationships (e.g., competition, parasitism, predation) of wildlife, ultimately leads to detrimental impacts on the ecological system.

11.6.2.2 Shifts timing of species migration, breeding and hibernation, and available food resources, causes redistribution of species, or mortality for species that are unable to relocate due to their already isolated habitat or limited mobility.

11.6.3 Phenology shifts related to species redistribution (Avg. Score: 1.00)

NJ Specific Threats: 11.6.3.1 Shifts in timing of species migration, breeding and hibernation, and available food resources, as a result of wildlife range shifts driven by climate change.

11.6.3.2 Shifts in nesting times or egg incubation durations can limit nest success and longterm populations.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 3.00)

NJ Specific Threats: 12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.2 Lack of up-to-date existing information (Avg. Score: 3.00)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.3 Need to answer research question (Avg. Score: 3.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.4 Need to develop new technique (Avg. Score: 2.00)

NJ Specific Threats:
- 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.
- 12.1.4.2 Improve and evaluate survey methods for species not easily detected through standard survey methods.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 1.00)

NJ Specific Threats:
- 12.3.0.1 Regulatory habitat protections within state land use regulations are spatially limited to specific geographic areas (e.g., Pinelands, Coastal Area) or geographic features (e.g., wetlands, streams) and so fail to protect critical habitats that exist outside of these regulated areas.
- 12.3.0.3 Lack of a licensing program and standards for NJ Nuisance Wildlife Control Operators (NWCOs) leads to inadequate controls over handling of wildlife and lack of reporting of non-game/SGCN species (and all wildlife) encountered in nuisance situations.
- 12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.
- 12.3.0.9 Prescribed burns implemented by the NJ Forest Fire Service are constrained by State air quality regulations to a timeframe where seasonal weather conditions are less than ideal for effective burning. As a result, the Forest Fire Service is limited in the number of overall prescribed burns it can implement to restore habitat for wildlife.
- 12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 1.00)

NJ Specific Threats:
- 12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.
- 12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.
- 12.4.0.3 Lack of internal understanding regarding beneficial habitat impacts of storm events leads to policies and practices that reverse or decrease such beneficial effects (e.g., beach-filling, shoreline hardening, “hazard” tree and log removal from forests, etc.
- 12.4.0.5 Bureau of Forest Fire Management policy has traditionally implemented prescribed burns on State lands for the sole purpose of public safety (i.e., addressing hazard fuel reduction), missing opportunities to burn in a manner that would additionally manage habitat for ecological diversity.
- 12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 2.00)

NJ Specific Threats:
- 14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.
- 14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 2.00)

NJ Specific Threats: 14.2.1.1 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various forest management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 1.00)

NJ Specific Threats: 15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.4 Secure and promote the protection, restoration, and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts through incentive programs.

1.2.1.5 Secure and promote the protection/restoration of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.9 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing Forestry Stewardship Programs.

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.12 Create incentives (non-monetary and/or monetary) for land developers to redevelop abandoned areas (e.g., shopping centers, office complexes) to minimize the loss of natural habitats and reduce the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.18 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and land managers to control and reduce the impacts of invasive, native and non-native species in order to increase structural habitat diversity.

1.2.1.19 Create incentives for federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to farmers, woodland landowners, and private landowners to adopt and/or endorse consistent BMPs concerning controlled burns to maintain and/or improve wildlife habitat.

1.2.1.20 Coordinate across government agencies and non-government organizations to create or expand upon tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMP's.

1.2.1.23 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to provide cost shares and/or plan approvals for management based on management approaches and prescriptions.

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

1.2.1.28 Create incentives to implement dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

2 Direct Management of Natural Resources

2.2 Dam and barrier removal

2.2.1 Culvert work

2.2.1.1 Replace existing barriers to wildlife movement with and/or install appropriately-sized systems to accommodate wildlife dispersal.

2.3 Fire management

2.3.2 Fuel reduction

2.3.2.1 Prevent wildfires by reducing natural fuel (e.g., leaf litter).

2.3.3 Prescribed burning

2.3.3.1 Evaluate different management techniques of prescribed burns that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

2.3.3.2 Conduct prescribed burning in Northern New Jersey forests to maintain and regenerate a mosaic of upland forest habitats.

2.3.3.3 Conduct prescribed burning to improve wildlife habitat.

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.5 Implement biologically safe and appropriate control/management strategies, and where appropriate, eradication strategies to reduce the impacts and/or limit the distribution of invasive and/or non-native plant species within or near aquatic systems using methods that will provide the most protection to the aquatic and riparian ecological system, and minimize disturbance to the soil and wildlife. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.8.0.6 Implement long-term management of invasive and/or non-native plants to help maintain functioning ecological systems and biological diversity, and to enhance travel corridors. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.3 Restore and/or enhance habitats to benefit urban-associated SGCN.

2.10.0.4 Restore and/or enhance suitable travel corridors connecting conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.8 Protect significant natural and/or unique communities by implementing best management practices when conducting habitat restoration strategies.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.12 Create and/or maintain scrub-shrub habitats through revegetation efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.15 Restore and/or enhance terrestrial and aquatic habitats proximate to but not adjacent to roads and other transportation corridors for terrestrial-bound SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.10.0.21 Restore and/or enhance understory habitats that suppress invasive species and provide critical resources and enhance sheltering, foraging, and nesting cover for wildlife.

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.10.0.24 Use NJ's CHANJ mapping and guidance to establish vegetation and enhance or create corridors between fragmented habitats with similar vegetation, slope, soils, structure, etc. to ensure vegetative integrity is maintained to allow wildlife to safely disperse, and corridors are buffered with natural habitats to minimize disturbance to wildlife within the corridors.

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.11.0.3 Create suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats through vegetation management.

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through vegetation management.

2.11.0.6 Reclaim degraded rare species habitats by conducting vegetation management needed to restore habitat value for the documented/target SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.13 Implement best management practices (BMPs), protective strategies, and guidelines for vegetation management to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.11.0.14 Conduct vegetation management adjacent to roads for SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.11.0.16 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.11.0.18 Implement forest management/silvicultural strategies that promote the development of new old-growth forests and/or minimize the loss of old-growth forest stands with large trees and within large, contiguous tracts.

2.11.0.19 Implement forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN.

2.11.0.20 Create and/or maintain scrub-shrub habitats through management efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.11.0.23 Implement appropriate habitat management actions in areas where natural disturbances, such as wildfire, have been precluded.

2.11.0.25 Conduct vegetation management along access roads following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.26 Conduct vegetation management along roadsides and medians, avoiding peak activity periods for wildlife, that enhances wildlife dispersal naturally and safely across roads and similar barriers to/between terrestrial and/or aquatic habitats.

2.11.0.27 Conduct vegetation management for target shrub- or young forest-dependent SGCN following BMPs to minimize the risk of the establishment of invasive and non-native plants.

2.11.0.28 Conduct vegetation management in agricultural areas following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.29 Conduct vegetation management on transportation and service corridors (i.e., rights-of-way) following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.31 In areas where vegetative communities are shifting due to fire suppression and controlled burns are not feasible, manage vegetation to improve wildlife habitat.

2.11.0.32 Increase structural habitat diversity around and when feasible, within agricultural landscapes by managing vegetation for a variety of species, in particular, those farms that have removed scrub-shrub habitat and/or fragmented forests, and by implementing ecologically best practices (e.g., no-till farming, maintaining hedgerows, buffer set-asides, etc.).

2.11.0.33 Increase structural habitat diversity by implementing long-term vegetation management to minimize the potential for the establishment of invasive and/or non-native plants that may outcompete native vegetation.

2.11.0.34 Increase structural habitat diversity by managing residential, commercial and recreational areas' landscapes for a variety of species. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.

2.11.0.37 Increase structural habitat diversity by minimizing the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats which benefits wildlife.

2.11.0.38 Increase structural habitat diversity in and around horse/livestock farms by managing vegetation for a variety of species, in particular, in and around farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

2.11.0.39 Increase structural habitat diversity in and around solar farms by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.40 Increase structural habitat diversity surrounding areas used for energy, mining, and transportation and service corridors by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides, and avoid managing habitat during the breeding seasons for ground-nesting birds, reptiles, amphibians and small mammals.

2.11.0.41 Increase structural habitat diversity through the implementation of a variety of vegetation management practices such a prescribed burns (either increasing or decreasing their frequency depending on the site and objective), plantings, etc. that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.42 Increase structural habitat diversity within wind farms for terrestrial bound and low-flying species and around wind farms for other wildlife by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.43 Manage forests to increase variation in age structure and composition using BMPs that promote and maintain functioning ecological forest-based systems and biological diversity.

2.11.0.45 Regularly and/or rotationally create young forest habitat in targeted areas to maintain and regenerate a mosaic of upland forest habitats that will benefit shrub- and young forest-dependent species.

2.13 Wildlife damage management

2.13.0 Nuisance fish and wildlife damage

2.13.0.5 Investigate the impacts of human-subsidized and/or naturally occurring predator species on SGCN to assess the need for integrated wildlife damage management techniques (e.g., predator exclosures, fish blockages, electric fence, culls) and/or policy changes on state land management that minimize the impacts of human-subsidized predators.

2.13.0.8 Implement and assess management strategies to control and reduce the impacts of detrimental species and diseases that pose threats to native wildlife or communities.

2.14 Wildlife disease management

2.14.0 Wildlife disease strategy development and investigation

2.14.0.1 Investigate diseases/pathogens impacting SGCN and/or their habitats.

2.14.0.2 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

2.14.0.4 Conduct long-term monitoring of diseases in vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts.

2.14.0.5 Assess the impacts of diseases on the life cycles of wildlife.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.6 Conduct long-term studies on resident and migratory SGCN to determine if there are changes to the populations' demography (productivity, survival, dispersal) and/or to their critical and/or supporting habitats (i.e., diminishing in value, acreage or connectivity, etc.), in particular changes that would not maintain SGCN at viable levels for species populations. Update data and GIS maps; provide updated information to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.11 Develop, implement and evaluate the effectiveness of town plans that avoid impacts to SGCN species and their habitats.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.19 Identify the presence and status (e.g., functioning, structure, slated for removal, etc.) of existing dams and culverts within and/or that may impact SGCN and their habitats, and create a database that includes a GIS component identifying the locations of such structures and their status. Share this information with appropriate organizations and/or agencies evaluating the benefits and risks of such structures on SGCN and their habitats.

3.0.0.20 Once baseline data identifying and describing the status of existing dams and culverts have been gathered, conduct evaluations at a variety of sites to determine whether the benefits of culvert and dam creation or removal outweigh the risks to SGCN species and their habitats, and if other variables/conditions specific to individual sites/locations result in a different outcome. Identify and target appropriate dams and culverts for removal and/or reconstruction to minimize harm to SGCN species and their habitats.

3.0.0.26 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species including objectives and guidance pertaining to and the condition/status of critical and supporting habitats.

3.0.0.27 Evaluate the effectiveness of strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals through research and monitoring. Develop and provide NJ DEP and other appropriate governing agencies/commissions a summary of findings and recommendations to improve such efforts.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.4 Conduct long-term monitoring of the impacts of contaminants to vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.2.0.5 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

3.2.0.6 Develop, implement and conduct studies to evaluate the effectiveness of methods implemented to reduce road mortality of wildlife (e.g. wildlife underpasses, road closures).

3.2.0.7 Track (via a database that includes a GIS component) and research problematic species and diseases to determine their distribution, impacts on SGCN wildlife/wildlife communities, and develop potential control measures.

3.2.0.8 Implement and conduct long-term monitoring of control measures aimed at minimizing the impacts of problematic species and/or diseases to evaluate the effectiveness of such efforts and to identify and incorporate additional strategies as appropriate.

3.2.0.10 Evaluate the effectiveness of sanitation/decontamination protocols in minimizing the transference of wildlife diseases and invasive plant species.

3.2.0.12 Investigate the impacts of ORV use and ORV-created noise on terrestrial and aquatic wildlife behavior and the impact of direct mortality from vehicle strikes. Integrate this information when mapping undeveloped roads and trails to identify potentially sensitive areas in northern NJ forests.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.2 Age, size and sex structure

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.3 Baseline inventory

3.2.3.6 Investigate the feasibility and potential for success of conducting genetic rescue through translocation and/or reintroduction of animals into suitable habitat that was historically occupied to increase genetic diversity and reconnect isolated populations. Methods of investigation should include, but are not limited to, thorough literature reviews, expert opinions, identifying potential pitfalls (e.g., species' fidelity to their range or critical areas), and an examination of historic and current SGCN population distribution and suitable habitat availability.

3.2.3.7 Identify roads or portions of roads, paved or unimproved (through site surveys, land use/land cover assessments and analyses, review of available data, enlistment of species experts, etc.) with high incidences of road mortality and/or presence of snakes, turtles, medium-sized and large mammals. Conduct assessments of the roads and incorporate information into a database that includes descriptions (e.g., qualifiers to help prioritize the roads' risk to wildlife) and a GIS component of the locations of such areas. Share this information with appropriate organizations and/or agencies working to implement measures (e.g., wildlife passages, road closures) to minimize the risk to these species.

3.2.4 Food habits

3.2.4.1 Monitor and investigate the populations and health of SGCN prey/food resources for those SGCN whose populations are thought to be limited due wholly or in part to a lack of food resources or toxins in food resources.

3.2.5 Genetics

3.2.5.1 Investigate the feasibility and potential for success of conducting genetic rescue through translocation and/or reintroduction of animals into suitable habitat that was historically occupied to increase genetic diversity and reconnect isolated populations. Methods of investigation should include, but are not limited to, thorough literature reviews, expert opinions, identifying potential pitfalls (e.g., species' fidelity to their range or critical areas), and an examination of historic and current SGCN population distribution and suitable habitat availability.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.6 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) that could, through revegetation and/or enhancement efforts, become suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN.

3.3.1.7 Map and prioritize existing and potential areas for early succession forest management. Share the results with state, county and municipal planners.

3.3.1.8 Assess the availability and suitability of forest habitats for SGCN species (particularly reptiles and amphibians, birds, pollinators, and tiger beetles) in southern forests since Superstorm Sandy.

3.3.1.9 Inventory forests throughout northern New Jersey to develop a baseline characterization of the structure and composition of habitats and identify deficient forest habitat types.

3.3.1.16 Gather "best information" for spatial modeling and update/create a current model/depiction of anticipated habitat shifts from sea-level rise, flooding, etc.

3.3.1.17 Identify and map undeveloped roads and trails in all conserved forests, and create a database of locations. Integrate information regarding potentially sensitive areas.

3.3.1.18 Conduct an assessment using available data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels.

3.3.1.19 Identify and codify legal ORV access areas on state (and if appropriate, other conserved) lands. Provide GIS mapping to the landowner for potential use in directing such recreational activities.

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.2 Monitoring

3.3.2.1 Evaluate the effectiveness of forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.8 Evaluate the effectiveness of current prescribed burning practices on Pinelands dependent species.

3.3.2.9 Investigate the effectiveness of various silviculture techniques for enhancing forests for forest-dependent SGCN.

3.3.2.10 Evaluate the efficacy and success of different management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.3.2.15 Investigate the effectiveness of management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.3.2.20 Once a system is developed for reporting and qualifying new locations of invasive species, develop, implement and monitor/evaluate invasive species removal strategies at identified locations. Priority should be given to those areas critical to SGCN and/or contain unique and/or rare plant communities supporting SGCN and/or other fish/wildlife species.

3.3.2.24 Conduct regular inventories of forests throughout northern New Jersey to characterize the changing structure and composition of habitats and monitor forest conditions.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.3 Develop/improve management techniques that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.7 Develop/improve forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

3.5.3.8 Develop best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5.3.9 Develop strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.14 Develop aquaculture practices in the coastal areas that are compatible with the recovery of SGCN.

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.3.16 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.3.19 Work with foresters to develop prescribed burning practices for Pinelands dependent species that increase or maintain habitat quality for these species in the Pinelands.

3.5.3.20 Develop guidance on various silviculture techniques for enhancing forests for forest-dependent SGCN.

3.5.3.21 Develop management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.24 Based on research, modify management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.1 Develop studies to evaluate management strategies to improve the availability of prey/food resources for SGCN whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources. Monitor and investigate the management strategies over time to determine success and/or the need to revise methods.

3.5.4.5 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

3.5.4.6 Investigate the feasibility of mitigating for the impacts of contaminants to vulnerable wildlife, particularly SGCN. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.5.4.7 Investigate the feasibility and potential for success of conducting genetic rescue through translocation and/or reintroduction of animals into suitable habitat that was historically occupied to increase genetic diversity and reconnect isolated populations. Methods of investigation should include, but are not limited to, thorough literature reviews, expert opinions, identifying potential pitfalls (e.g., species' fidelity to their range or critical areas), and an examination of historic and current SGCN population distribution and suitable habitat availability.

3.5.4.9 Conduct studies to evaluate the impacts of roads on SGCN and develop, implement and conduct studies to evaluate the effectiveness of methods to reduce road mortality of wildlife (e.g. wildlife underpasses, road closures).

3.5.4.13 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.4.14 Develop and implement agreements, and update existing agreements, with government agencies regarding the protection of critical SGCN habitats (e.g., significant breeding populations of beach nesting birds, colonial waterbird nesting areas, bat colonies, etc.).

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.17 Investigate new, non-invasive techniques for SGCN population evaluation through literature review, expert opinion, trial studies (if low risk), etc.

3.5.4.18 Investigate the effectiveness of survey techniques through selected "ground truthing" and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

3.5.4.21 Develop BMPs to address problematic species and diseases of unknown origin.

3.5.4.22 Investigate the efficacy of implementing strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities.

4 Education

4.1 Educator/Instructor training

4.1.0 Public education

4.1.0.1 Provide educational resources and training programs to private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

5 Facilities and Areas

5.15 Wildlife Management Areas

5.15.6 Roads

5.15.6.2 Clearly post areas/trails where vehicle access is not permitted.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.1 Enhance and increase the effective size of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates by securing adjacent habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.6 Secure and protect old-growth forest stands with large trees and/or stands that are approaching or being actively managed for old growth forests, in particular those within large, contiguous forest tracts, through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.7 Secure and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.8 Secure and protect scrub-shrub habitats for SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.1 Promote the protection of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates and enhance these lands by increasing the effective size through conservation area designations of stopover habitats and adjacent private lands.

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.6 Promote the protection of old-growth forest stands with large trees and/or stands that are approaching or being actively managed for old growth forests, in particular those within large, contiguous forest tracts, through conservation area designations.

6.3.0.7 Promote the protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through conservation area designations.

6.3.0.8 Promote the protection of scrub-shrub habitats for SGCN through conservation area designations.

6.4 Private lands agreements

6.4.0 Private land agreement strategies

6.4.0.1 Enter into private lands agreements to expand control burns on private lands, in particular those adjacent to conserved lands to improve SGCN habitats.

7 Law Enforcement

7.1 Law enforcement

7.1.3 Sub-national Level

7.1.3.2 Increase the number of law enforcement officers tending to wildlife issues to a reasonable number to sufficiently cover the State and marine waters.

7.1.4 Scale Unspecified

7.1.4.3 Increase law enforcement presence proximate to sensitive areas [e.g., avian nesting sites, in particular rookeries, and reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively)] to deter human activity and subsequent disturbance to SGCN.

7.1.4.6 Recruit law enforcement to assist in the protection and enhancement of SGCN populations, in particular endangered species, through improved awareness of species through trainings, partnerships, and other methods. Information should include but is not limited to: 1) Issues concerning illegal collection of reptiles, 2) Persecution of rare snakes, 3) Illegal recreational activities on public lands (e.g., off-road vehicles) and their impact on wildlife, 4) Identification of sensitive areas, critical sites and/or "hot-spots" for collection.

7.1.4.7 Increase law enforcement presence to enforce regulations governing recreational activities (e.g., the use of personal watercraft and off road vehicles, caving, rock climbing, etc.) on conserved lands and within other sensitive habitats, and discourage activities that cause harm or disturbance to vegetation, wetlands, fish and wildlife.

7.1.4.9 Implement policies that improve and secure habitat connections between conserved SGCN habitats.

7.1.4.10 Implement policies that promotes expanding acreages and enhances the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.14 Implement policies that protect existing and developing old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

7.1.4.15 Implement policies that preserve and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

7.1.4.19 Implement policies that protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

7.1.4.22 Implement policies and/or regulations that prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

7.1.4.23 Implement policies that minimize wildlife road mortality.

7.1.4.25 Encourage the enforcement of municipal laws regulating domestic pets that may predate on wildlife.

7.1.4.26 Educate law enforcement personnel that there may be unauthorized research projects taking place and to encourage them to investigate any activities that appear to be harmful to wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.1.0.4 Engage government agencies, conservation partners and other stakeholders in constructive dialogues encouraging them to influence policy change and the creation of incentives through a habitat bill and/or municipal ordinances for backyard habitat.

8.1.0.11 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting sportsmen's organizations and fisheries, as well as public constituents, addressing the unintended effects abandoned fishing gear, tackle and crab pots can have on wildlife, and promote the collection and/or reporting of abandoned items and their locations.

8.1.0.13 Engage DOD in a constructive dialogue regarding strategies to minimize disturbances to all SGCN (i.e., beyond their federal requirements) from forest management and other practices on their lands.

8.1.0.14 Engage DOD in a constructive dialogue regarding strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities.

8.1.0.15 Engage government agencies, conservation partners and other stakeholders in discussions encouraging and supporting the creation of laws and policies requiring vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

8.1.0.16 Engage local governments in discussions regarding the importance of them adopting/passing ordinances which require assessing and addressing secondary impacts (i.e., ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

8.1.0.17 Engage municipalities in constructive dialogue to identify and minimize destruction of areas prioritized for early succession forest management.

8.1.0.18 Engage NJDOT, NJ Transit Authority and other road management entities, wildlife conservation organizations/agencies (e.g., Division of Fish and Wildlife, New Jersey Conservation Foundation, Conserve Wildlife Foundation of NJ), and communities and citizens in discussions regarding the importance of and methods to enhance habitat connectivity, and work together to develop feasible strategies for ensuring that wildlife can disperse naturally and safely across roads and similar barriers to terrestrial and/or aquatic habitats.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.21 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation human-subsidized and/or overabundant, native species cause to local nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.26 Coordinate across federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to woodland landowners to adopt or endorse consistent best management practices concerning controlled burns to maintain and/or improve forested habitat for wildlife.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.34 Work with the NJ Education Association and Department of Education to design curriculum and outdoor experimental learning opportunities, and provide training to teachers on implementation of these activities.

8.1.0.37 Enlist landowners and NJ citizens in the protection of and survey efforts for SGCN, in particular rare species, by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management and wildlife-related volunteer programs.

8.1.0.38 Engage partners, stakeholders and land managers in constructive dialogue promoting forest stewardship for SGCN that use core forests and forested corridors.

8.1.0.40 Encourage researchers, land managers, naturalists and enthusiasts to follow proper procedures for the coordination and/or permitting of research/management activities involving wildlife and sensitive habitats, and discourage activities that alter vegetation or wetlands, or cause harm or disturbance to wildlife.

8.1.0.42 Engage citizens, wildlife observers and photographers through discussions and distributable information regarding the importance of and encouraging implementing responsible and ethical behavior when observing wildlife by developing an alliance of wildlife photographers and widely circulating recommendations on how to reduce impact.

8.1.0.44 Engage conservation partners, stakeholders, government agencies and other land stewards in constructive dialogues encouraging their inclusion of controlled burns in forest and other stewardship plans.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.6 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners, land managers and local communities to discourage the presence of managed cat colonies and trap, neuter and release programs in wildlife habitats.

8.3.0.7 Develop and provide (or otherwise make publicly available) educational programs and/or materials that describe the negative impacts of off-road vehicles and watercraft use in and adjacent to critical SGCN habitats, and the importance of confining such activities to more appropriate locations and/or seasons.

8.3.0.8 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate recreationists and encourage landowners to eliminate garbage in the vicinity of suitable wildlife habitat, in particular SGCN habitat. Information should include the detrimental impacts garbage may have on various wildlife species.

8.3.0.9 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners and land managers to include only native plants in landscaping and restoration projects. Provide information to assist them in detecting problematic establishment of invasive, non-indigenous plants.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.11 Develop and provide (or otherwise make publicly available) educational programs and/or materials to the public, wildlife-related professionals, foresters, etc., that describe the value of species that are often feared (e.g., snakes, bats, spiders, Allegheny woodrat) and/or deemed a "nuisance" (e.g., squirrel, deer, snapping turtle), and therefore, persecuted by people. Include information on tolerance, proper identification, eviction from human dwellings, how to minimize the animal's presence on the property, and/or how to live in harmony with the animal.

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.19 Develop an educational outreach program for the public on the devastating effects predators can have on native nesting wildlife.

8.3.0.24 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

8.3.0.26 Develop educational outreach programs for private and public landowners and land managers regarding the importance of and how to manage core forests and forested corridors in a way that will be beneficial for SGCN, particularly endangered, threatened and special concern species.

8.3.0.27 Develop educational outreach programs for public and private landowners and land managers regarding the importance of structural habitat diversity, methods to increase diversity, and/or incentive programs available to increase habitat diversity.

8.3.0.30 Develop educational outreach programs for private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

8.3.0.31 Develop an educational outreach program for landowners and citizens on the secondary impacts of rodenticides on predators and scavengers.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.5 Develop a plan that directs the creation or expansion of energy or utility rights-of-way in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.6 Develop a plan that directs the creation or expansion of roads and railroads or the re-establishment of abandoned railroads within and adjacent to critical forested habitats in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.8 Develop a plan that focuses on strategies for oil pipelines to avoid sensitive habitats that would be highly impacted by oil spills.

9.1.0.9 Develop a plan that focuses on strategies to minimize the creation of renewable energy farms (e.g., solar, wind) and related infrastructures within and their impacts on forested habitats and the wildlife community.

9.1.0.10 Develop a plan that focuses on strategies to minimize the impacts of mining on critical forested habitats.

9.1.0.11 Develop a plan that focuses on strategies to minimize the impacts of power plants on critical forested habitats and the wildlife community.

9.1.0.15 Develop a plan to minimize fragmentation of terrestrial and aquatic habitats by roads.

9.1.0.16 Develop a plan to minimize new lawnscapes and preserve natural vegetation within and adjacent to critical forest areas.

9.1.0.18 Develop a plan to minimize the effects of road widening and traffic volume increases within critical wildlife habitat areas using CHANJ products.

9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

9.1.0.20 Develop a plan to minimize the impacts of existing agricultural properties adjacent to and the conversion of forest habitats (terrestrial and aquatic, within or adjacent to critical forests) to agriculture, grazing areas/livestock farms, and plantations.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.23 Develop a plan to mitigate the effects of transportation barriers by using CHANJ products.

9.1.0.27 Develop a plan to use wildlife-appropriate culverts in critical forested areas.

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.2 Organizational strategic and CMS planning

9.2.1 Organizational strategic and operational planning

9.2.1.1 Identify and codify legal ORV access areas on state lands.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.7 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.10 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.14 Create species management plans that will promote the protection and where appropriate, the development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

9.3.1.16 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.2 Listed species recovery planning

9.3.2.1 Develop proactive species recovery plans for all endangered and threatened species including guidance and objectives pertaining to critical and supporting habitat to meet and maintain recovery goals.

9.3.3 Habitat management planning

9.3.3.5 Develop a management plan using forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

9.3.3.6 Develop a management plan for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

9.3.3.7 Develop a management plan to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

9.3.3.8 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.3.13 Develop a management plan that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas and prevents or ameliorates near-term impacts of climate change throughout the State, but in particular within the coastal and Delaware Bay areas.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.16 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.3.17 Develop a management plan for prescribed burning that will benefit Pinelands dependent species and increase or maintain habitat quality for these species in the Pinelands.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.21 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.3.22 Create management plans to minimize and/or prevent wildlife road mortality that will incorporate wildlife passages in conjunction with barrier fencing and, where possible, seasonal closures. Aquatic-associated passages must avoid disturbance to the natural streambeds and riparian habitat, permit high volumes of water to flow freely, and provide adequate travel corridors for terrestrial wildlife, while maintaining stream flow for fish passage. Bridges that span rivers and streambeds and include floodplain habitat on either side of the span to provide travel corridors for terrestrial wildlife are preferred over culverts.

9.3.3.23 Create forest management plans that will promote the protection and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

9.3.3.29 Develop habitat management plans aimed at reducing or eliminating negative impacts of ORVs.

9.3.3.32 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3.34 Include controlled burn prescriptions in forest and stewardship plans to improve wildlife habitat.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.10 Use CHANJ mapping in reviews of proposed energy, mining, transportation and utility service companies/agencies' projects to attempt to maintain habitat connectivity and reduce fragmentation, and identify potential impacts of the projects.

11.1.1.12 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed solar farm projects to reduce habitat fragmentation and minimize impacts on wildlife.

11.1.1.13 Use the best available science (species data, habitat present, wind farm layout options, wind blade impacts on migratory species, location of migration routes, etc.) when conducting regulatory reviews of proposed wind farm projects to minimize impacts on migratory and resident wildlife and reduce habitat fragmentation.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.2 Provide technical support to public and private landowners and land managers for controlling invasive, native and non-native plant species in order to increase structural habitat diversity.

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.4 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the secondary impacts of rodenticides on predators and scavengers.

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.7 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on the importance of maintaining habitat connectivity, minimizing fragmentation, and the use of CHANJ products to help them target areas for such planning.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.11 Provide educational resources, training programs, and on-the-ground guidance to private and public landowners and land managers on the benefits of and for creating young forest and early succession habitat for SGCN.

11.2.0.13 Provide educational resources and technical support to public landowners, private landowners with sufficient acreage, and land managers to promote the protection and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

11.2.0.16 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

11.2.0.19 Provide educational resources and technical support to public and private landowners and land managers to promote the protection and/or enhancement of scrub-shrub habitats for SGCN.

11.2.0.21 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates to promote the protection and/or enhancement of those adjacent habitats to increase the effective size of the migratory habitat.

11.2.0.22 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

11.2.0.23 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to SGCN habitats to promote the protection and/or enhancement of those adjacent habitats to increase the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and that connect conserved SGCN habitats.

11.2.0.24 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers on how to manage vegetated roadside areas (e.g., mowing, brush-hogging, etc.) on a schedule that avoids peak activity periods for wildlife and therefore, minimizes harm.

11.2.0.25 Provide educational resources, training programs, and on-the-ground guidance to resource managers regarding the assessment of and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) related to residential and commercial development.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.0.29 Provide educational resources, training programs, and on-the-ground guidance to Nuisance Wildlife Control Operators (NWCOs), conservation partners, and the public in conserving snake populations by advising proper removal from buildings, exclusion methods from buildings, and improving the public's understanding and acceptance of snakes.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.1 Engage partners and stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.3 Provide educational resources, training programs, and on-the-ground guidance to DOD to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop and implement forest management and other practices that minimize disturbances to SGCN (i.e., beyond their federal requirements).

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

11.2.2 With private landowners

11.2.2.1 Provide technical support to farming operations and woodland landowners on ways to decrease clean farming (edge-to-edge) practices and create ecotones to benefit bobwhite and other species dependent on early successional habitat.

100 Law and Policy

100. Legislation

100.1.3 Sub-national Level

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.4 County and Local

100.1.4.1 Enhance critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates through the local ordinances of adjacent private lands to increase the effective size of the habitat.

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.3 Expand the acreages and enhance the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN through local ordinances.

100.1.4.9 Secure existing and developing old-growth forest stands with large trees, in particular those within large, contiguous forest tracts, through local ordinances.

100.1.4.10 Secure critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through local ordinances.

100.1.4.12 Secure scrub-shrub habitats for SGCN through local ordinances.

100.1.4.13 Encourage municipal laws regulating domestic pets that may predate on wildlife.

100.1.4.14 Adopt/pass local ordinances which require assessing and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.3 Develop policies that will promote the long term protection of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates.

100.3.0.5 Develop policies that will promote improved and secure habitat connections between conserved SGCN habitats.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.11 Develop policies that will ensure the protection and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

100.3.0.12 Develop policies that promote the preservation and protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.15 Develop policies that promote protecting and restoring scrub-shrub habitats to benefit shrub-dependent SGCN.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.20 Develop policies and/or regulations that prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

100.3.0.21 Develop policies that minimize wildlife road mortality through: 1) Requiring the integration of wildlife passages into all new and repaired roads, in particular those areas that will connect SGCN habitats, 2) Requiring current fish/wildlife passages be improved and maintained in perpetuity, 3) Supporting seasonal road closures, in particular for unimproved roads, 4) Supporting projects that work to improve connectivity of SGCN habitats such as land conservation through acquisition or other means.

100.3.0.31 Create or expand tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMPs.

100.3.0.32 Coordinate regulations across agencies to maximize availability of and enrollment in existing Forestry Stewardship Programs (e.g., "Woodland Stewards", Farm Bill, partners, etc.) to maintain and/or improve forest habitat.

100.3.0.36 Create legislation to limit the amount of plastic from shopping bags in circulation and re-instate incentives for citizens bringing their own shopping bag to grocery store.

100.3.0.40 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.45 Increase the controlled burn season to focus on restoring vegetative communities.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.48 Propose new State law or regulation mandating that a State-level "development impact fee" be assessed on all new development approved by municipalities (via the Municipal Land Use Law processes), and dedicate such monies to the development and implementation of regional Habitat Conservation Plans (or existing plans/programs serving the same regional function).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.53 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded rights-of-way corridors associated with energy transport/transmission.

100.3.0.54 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded surface mining areas.

100.3.0.57 Develop regulations that when implemented will improve and secure habitat connections between conserved SGCN habitats.

100.3.0.58 Develop regulations that when implemented will promote the expansion of acreages and enhancement of the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.62 Develop regulations that when implemented will protect existing old-growth forest stands with large trees and/or stands that are being actively managed for old growth forests, in particular those within large, contiguous forest tracts.

100.3.0.63 Develop regulations that when implemented will preserve and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.65 Develop regulations that when implemented will protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

100.3.0.68 Develop regulations that when implemented will prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

100.3.0.69 Develop regulations that when implemented will minimize wildlife road mortality.

100.3.0.71 Develop regulations for licensing, permitting, or certification of Nuisance Wildlife Control Operators (NWCOs) that handle removal/exclusion of protected wildlife, such as bats and snakes, to ensure that proper methods are followed and that occurrences are reported.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100.3.0.73 Develop regulations that would exempt the conversion of lawns to native vegetation (beneficial to wildlife) from local lawn ordinances.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.2 Create a policy that requires the NJ DEP to incorporate scientific information regarding climate change and sea level rise (e.g., predictions, habitat management/acquisition efforts to enhance resilience to inundation) on their websites and to work with other government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

100.4.0.3 Develop policies for mandatory buffer strips on preserved farmlands and state-owned agricultural lands.

100.4.0.4 Create a policy that requires the use of wildlife habitat and corridor mapping products for both regulatory use when conducting project reviews and planning/siting new or expanded rights-of-way projects.

100.4.0.8 Develop a white paper addressing the impacts that existing, new or expanded rights-of-way have upon wildlife, wildlife habitats and habitat connectivity.

100.4.0.9 Develop and implement policies to minimize the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats in order to benefit wildlife.

100.4.0.12 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.4.0.13 Develop policies for different circumstances (e.g., roadsides and medians, riparian, aquatic and terrestrial habitats) that outline appropriate habitat/vegetation management strategies and schedules to minimize risks to and benefit wildlife.

100.4.0.16 Develop policies to implement habitat management strategies that will increase the structural diversity surrounding areas used for energy, mining, and transportation and service corridors which include but are not limited to the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-

100.4.0.17 Develop policies to implement habitat management strategies, including prescribed burns, that will increase the structural diversity on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies to control and reduce the impacts of invasive, non-native species in order to increase structural habitat diversity.

100.4.0.18 Develop policies to minimize the extent of infrastructure associated with energy and service corridors or areas (e.g., wind and solar farms, pipelines, utility lines) and that require the implementation of habitat management strategies that will increase the structural diversity in the area including (e.g., the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides).

100.4.0.19 Develop regulations that will minimize the creation of new barriers, remove or replace current barriers with appropriately-sized systems to accommodate wildlife dispersal, and to minimize road widening and traffic volume increases within critical wildlife habitat areas.

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Eastern Redbelly Turtle

Focal species that comprise this Conservation Target:

Eastern Redbelly Turtle

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:

- 1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.1.1.2 Loss, alteration and/or degradation of habitat.
- 1.1.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.
- 1.1.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.
- 1.1.1.5 Impervious surfaces can lead to a decrease in water recharge.
- 1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats:

- 1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.2.1.2 Loss, alteration and/or degradation of habitat.
- 1.2.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.
- 1.2.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.
- 1.2.1.5 Impervious surfaces can lead to a decrease in water recharge.
- 1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:

- 1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.3.1.2 Loss, alteration and/or degradation of habitat.
- 1.3.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.
- 1.3.1.4 Impervious surfaces can lead to a decrease in water recharge.
- 1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture (Avg. Score: 1.00)

NJ Specific Threats: 2.1.1.3 Conversion of agricultural landscape that results in increased erosion, runoff, and chemical and thermal pollution decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.1.2 Small-holder Farming (Avg. Score: 1.00)

NJ Specific Threats: 2.1.2.2 Fragments terrestrial and aquatic habitats.

2.1.2.4 Agricultural practices (e.g., mechanized, row-crop agriculture) can cause direct mortality to wildlife when harvesting takes places.

2.1.3 Agro-industry (Avg. Score: 1.00)

NJ Specific Threats: 2.1.3.2 Fragments terrestrial and aquatic habitats.

2.3 Livestock Farming and Ranching

2.3.2 Small-holder Grazing (Avg. Score: 1.00)

NJ Specific Threats: 2.3.2.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.2.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

2.3.3 Agro-industry Grazing (Avg. Score: 1.00)

NJ Specific Threats: 2.3.3.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.3.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

3 Energy Production and Mining

3.1 Oil and Gas Facilities and Pipelines

3.1.1 Distribution processes of petroleum and other liquid hydrocarbons (Avg. Score: 2.00)

NJ Specific Threats: 3.1.1.1 Fragments terrestrial and aquatic habitats.

3.1.1.2 Loss, alteration and/or degradation of habitat.

3.1.1.3 Increased risk of oil spills.

3.1.1.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.

3.1.2 Natural gas distribution processes (Avg. Score: 2.00)

NJ Specific Threats: 3.1.2.1 Fragments terrestrial and aquatic habitats.

3.1.2.2 Loss, alteration and/or degradation of habitat.

3.1.2.3 Increased risk of gas leaks and explosions.

3.1.2.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.

3.2 Mining and Quarrying

3.2.2 Surface Mining - Rock Quarry (and sand quarries) (Avg. Score: 1.00)

NJ Specific Threats: 3.2.2.1 Fragments terrestrial and aquatic habitats.

3.2.2.2 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

3.2.2.3 Increased risk of vehicle strikes/mortality to wildlife.

3.3 Renewable Energy

3.3.1 Wind Power (Avg. Score: 1.00)

NJ Specific Threats: 3.3.1.2 Fragments terrestrial habitats.

3.3.1.3 Loss, alteration and/or degradation of habitat.

3.3.1.4 Increased commercial infrastructure.

3.3.2 Solar Power (Avg. Score: 2.00)

NJ Specific Threats: 3.3.2.1 Fragments terrestrial habitats.

3.3.2.2 Loss, alteration and/or degradation of habitat.

3.3.2.3 Increased commercial infrastructure.

3.4 Conventional Power Plants

3.4.0 Conventional Power Plants (Avg. Score: 2.00)

NJ Specific Threats: 3.4.0.2 Loss, alteration and/or degradation of habitat due to new or the expansion of current facilities.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats: 4.1.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species and inhibiting dispersal of non-volant animals, reducing gene flow.

4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.1.1.4 Re-establishment of abandoned railroad lines may increase the risk of direct mortality on wildlife.

4.1.1.5 Re-establishment of abandoned railroad lines may decrease turtles' abilities to disperse due to their difficulty traversing the railroad ties and tracks, leading to decreased genetic exchange.

4.1.2 Movement of cars and other vehicles on roads and railroads (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats: 4.1.2.1 Increased vehicle traffic increases the risk of wildlife mortality from strikes.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads (Avg. Score: 2.00)

NJ Specific Threats: 4.2.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species, inhibiting dispersal of non-volant animals, reducing gene flow, and creating barriers to fish when service line-associated roads cross streams (e.g., bridges, culverts, fords, etc.).

4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

4.2.1.4 Lines that cross or run parallel to streams result in a loss or reduction of vegetated riparian buffers and streamside shading, affecting water quality and in-stream habitat for aquatic biota.

4.2.2 Management of rights-of-way or communication tower facilities and/or their associated access roads (Avg. Score: 2.00)

NJ Specific Threats: 4.2.2.1 Improper or poorly scheduled vegetation management can cause direct mortality to and may reduce productivity of wildlife.

4.3 Shipping Lanes

4.3.2 Dredging impacts (Avg. Score: 1.00)

NJ Specific Threats: 4.3.2.1 Threatens wildlife by disrupting/removing stream bottom habitat.

4.3.2.3 Transportation of materials to and from disposal facilities may pose temporary disturbance to wildlife impacting foraging and nesting success.

5 Biological Resource Use

5.1 Hunting and Collecting Terrestrial Animals

5.1.1 Intentional Use (Avg. Score: 1.00)

NJ Specific Threats: 5.1.1.1 Illegal collection of wildlife can have detrimental impacts on populations.

5.1.2 Unintentional effects (Avg. Score: 1.00)

NJ Specific Threats: 5.1.2.2 Disruption of normal wildlife behavior.

5.2 Gathering Terrestrial Plants

5.2.3 Control (Avg. Score: 1.00)

NJ Specific Threats: 5.2.3.2 Clearing of scrub-shrub vegetation [and snags] diminishes cover and nesting habitat.

5.2.3.3 Removal of riparian or near-stream vegetation alters water quality and in-stream habitat for aquatic organisms by reducing streamside shading, increasing bank erosion, and affecting the natural filtering ability of trees, shrubs, and grasses.

5.3 Logging and Wood Harvesting

5.3.1 Intentional Use (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.1.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.1.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.1.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.1.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.2 Intentional Use (large scale) (Avg. Score: 2.00)

NJ Specific Threats: 5.3.2.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.2.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.2.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.2.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.3 Unintentional effects (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.3.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4 Unintentional effects (large scale) (Avg. Score: 2.00)

NJ Specific Threats: 5.3.4.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4.2 Extensive infrastructure and larger equipment requirements present a potential risk of direct injury/mortality to wildlife.

5.3.4.5 Lack of appropriate, sustainable forest management can lead to a decrease in forest habitat diversity, degraded habitat for many forest species, the loss of habitat for early-successional species, and/or the loss of unique habitats for species that need canopy breaks and multi-aged tree composition to fulfill various life history requirements.

5.4 Fishing and Harvesting of Aquatic Resources

5.4.1 Intentional Use (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.4.1.4 Illegal collection of aquatic and semi-aquatic wildlife can have detrimental impacts on populations.

5.4.2 Intentional Use (large scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.4.2.4 Illegal collection of aquatic and semi-aquatic wildlife can have detrimental impacts on populations.

5.4.3 Unintentional effects (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.4.3.7 Improperly sanitized equipment, relocation of fish, importation and release of non-native species, and the use of bait from a different location can spread invasive species and diseases from one waterbody to another.

5.4.3.8 Lead in fishing tackle is consumed by wildlife in the course of foraging and scavenging, causing injury and death.

5.4.4 Unintentional effects (large scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.4.4.7 Improperly sanitized equipment, relocation of fish, use of bait from a different location, can spread invasive species and diseases from one waterbody to another.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized) (Avg. Score: 1.00)

NJ Specific Threats: 6.1.1.1 Inappropriate use of off-road vehicles creates new roads/trails which fragments habitat.

6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.

6.1.1.3 Increased risk of harassment that results in a change in wildlife behavior and/or direct mortality from vehicle strikes.

6.1.1.6 Off-road vehicles can be a mechanism of transference of wildlife diseases and invasive plant species if gear and apparel are not properly sanitized between sites.

6.1.2 Boating (Avg. Score: 1.00)

NJ Specific Threats: 6.1.2.1 Alteration and/or degradation of aquatic habitat.

6.1.2.3 Motorized boat propellers can inflict physical harm aquatic wildlife species.

6.1.2.5 Watercraft can be a mechanism of transference of wildlife diseases and invasive plant species if gear is not properly sanitized between sites.

6.1.5 Wildlife observation and photography (Avg. Score: 1.00)

NJ Specific Threats: 6.1.5.1 Improperly conducted recreational activities may disrupt normal wildlife behaviors which can result in reduced reproductive success or survival, abandonment of critical sites, etc.

6.1.5.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.2 Military Exercises

6.2.1 Military exercises (Avg. Score: 2.00)

NJ Specific Threats:

6.2.1.1 Military testing and training exercises may inflict disturbance and potential physical harm to wildlife.

6.2.1.3 Lack of opportunity for non-federal wildlife managers to influence activities on military bases may result in detrimental impacts to SGCN and/or missed opportunities to engage in projects that benefit SGCN.

6.3 Work and Other Activities

6.3.1 Unauthorized research projects at significant habitats (Avg. Score: 2.00)

NJ Specific Threats:

6.3.1.1 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.1.2 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.2 Authorized research projects at significant habitats (Avg. Score: 2.00)

NJ Specific Threats:

6.3.2.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.2.3 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.3 Other "work" unrelated to research (Avg. Score: 2.00)

NJ Specific Threats:

6.3.3.1 Construction projects may disrupt normal wildlife behavior which can result in reduced reproductive success or survival, abandonment of critical sites, etc. (e.g., bridge-nesting birds).

6.3.3.4 Workers may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

7 Natural Systems Modifications

7.1 Fire and Fire Suppression

7.1.1 Increase in Fire Frequency/Intensity (Avg. Score: 2.00)

NJ Specific Threats:

7.1.1.1 Increase in frequency and intensity of wild fires as a result of droughts and heat waves drying out vegetation and litter.

7.1.1.2 Increase in frequency of wild fires as a result of illegal activities.

7.1.1.3 Unnatural fire regimes occurring as a result of military exercises.

7.1.2 Suppression of Fire Frequency/Intensity (Avg. Score: 1.00)

NJ Specific Threats:

7.1.2.1 Shift in vegetative communities as a result of suppression of natural fires.

7.1.2.2 Lack of diversity in age structure and composition of vegetation due to the suppression of fire.

7.2 Dams and Water Management/Use

7.2.1 Abstraction of Surface Water (domestic use) (Avg. Score: 3.00)

NJ Specific Threats:

7.2.1.1 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.1.2 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.1.3 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, and eliminates shallow water habitats.

7.2.2 Abstraction of Surface Water (commercial use) (Avg. Score: 3.00)

NJ Specific Threats:

7.2.2.1 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, eliminates shallow water habitats, and disrupts/removes stream bottom habitat.

7.2.2.2 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.2.3 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.3 Abstraction of Surface Water (agricultural use) (Avg. Score: 3.00)

NJ Specific Threats:

7.2.3.1 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.3.2 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, and eliminates shallow water habitats.

7.2.3.3 Impounding water to create or expand bogs for cranberry farming leads to the loss of natural wetlands and the alteration of the natural hydrology in the area.

7.2.3.5 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.5 Abstraction of Ground Water (domestic use) (Avg. Score: 3.00)

NJ Specific Threats:

7.2.5.1 Heavy withdrawal of ground water for domestic use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.6 Abstraction of Ground Water (commercial use) (Avg. Score: 3.00)

NJ Specific Threats:

7.2.6.1 Heavy withdrawal of ground water for industrial and commercial use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.7 Abstraction of Ground Water (agricultural use) (Avg. Score: 3.00)

NJ Specific Threats:

7.2.7.1 Heavy withdrawal of ground water for agricultural use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.9 Small Dams (Avg. Score: 3.00)

NJ Specific Threats:

7.2.9.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.9.3 Dams act as a barrier to movement, limiting the ability of aquatic or semi-aquatic wildlife to move safely between habitats.

7.2.10 Large Dams (Avg. Score: 3.00)

NJ Specific Threats:

7.2.10.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.10.3 Dams act as a barrier to movement, limiting the ability of aquatic or semi-aquatic wildlife to move safely between habitats.

7.2.11 Dams (size unknown) (Avg. Score: 3.00)

NJ Specific Threats: 7.2.11.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.11.3 Dams act as a barrier to movement, limiting the ability of aquatic or semi-aquatic wildlife to move safely between habitats.

7.2.12 Culverts (Avg. Score: 2.00)

NJ Specific Threats: 7.2.12.1 Improper design, placement, installation and maintenance of culverts and other stream crossing structures can impede or prevent the movements of terrestrial organisms and can restrict or limit stream flow, impeding the movement of aquatic organisms along riparian corridors.

7.2.13 Stream Burial (Avg. Score: 1.00)

NJ Specific Threats: 7.2.13.1 Eliminates riparian habitats.

7.2.13.2 Eliminates in-stream habitat and water resources for wildlife.

7.3 Other Ecosystem Modifications

7.3.2 Inappropriate timing of mowing (Avg. Score: 3.00)

NJ Specific Threats: 7.3.2.1 Increased risk of direct mortality and/or reduced productivity of wildlife, as well as reduced use by migrating species.

7.3.3 Removal of coarse woody debris (streams, forests, scrub-shrub habitats) (Avg. Score: 2.00)

NJ Specific Threats: 7.3.3.1 Decreases the available detritus that normally accumulates behind and within stream obstructions, minimizing or eliminating food sources and shelters for fishes, invertebrates and amphibians.

7.3.3.2 Decreases habitat and/or corridor suitability due to limited or absent shelter and foraging habitat.

7.3.3.3 Removal of dead trees (snags), large felled logs (i.e., those > 12" dbh), and other downed woody material diminishes nesting, roosting, and sheltering options for wildlife, and increases the ease at which deer can browse regenerating vegetation.

7.3.3.4 Decreases available basking, shelter, and foraging habitats.

7.3.5 Poor habitat management (Avg. Score: 1.00)

NJ Specific Threats: 7.3.5.1 Improper or poorly scheduled maintenance of man-made corridors (e.g., roadsides and medians) can cause direct mortality to and may reduce productivity of wildlife.

7.3.5.2 Shifting from natural vegetation to lawns can cause increased temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

7.3.5.3 Vegetation clearing removes terrestrial and riparian corridors for animal movement, shelter, and resting areas.

7.3.5.4 Vegetation clearing or inappropriate alteration adjacent to aquatic habitats threatens aquatic species by degrading habitat and water quality (altering temperature and dissolved oxygen, increasing siltation and desiccation, etc.).

7.3.5.5 Habitat management that alters or removes vegetation without implementing long-term management increases the risk of invasive and exotic plants establishing themselves, outcompeting native vegetation.

7.3.5.6 Habitat management, including that which occurs on public and private lands, that does not consider timing and species' behaviors can result in the direct mortality and/or alteration or loss of habitat.

7.3.5.7 Improperly planned habitat management and/or mitigation efforts along roadsides and within the medians can attract wildlife and increase the risk of vehicle strikes.

7.3.5.9 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, eliminates shallow water habitats, and disrupts/removes stream bottom habitat.

7.3.5.10 Ditching, draining and filling of marshes and wetlands eliminates habitat and degrades the remaining surrounding areas for wildlife.

7.3.5.12 Lack of diversity in age structure and composition of vegetation due to lack of natural disturbances and/or vegetation management.

7.3.5.13 Private landowners with rare species on their properties are not always cooperative in the protection and management of the species' habitats. Landowners may be held accountable for their actions when they cause harm to the species or destroy the habitat, but it is often too late for the species' population.

7.3.5.14 Intentional felling and removal of dead standing trees or snags eliminates resting, nesting or feeding habitat, and precludes the snags eventual contribution to coarse woody debris and forest floor structure and habitat.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species (Avg. Score: 2.00)

NJ Specific Threats:

8.1.1.1 Displace or outcompete native species for resources.

8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.

8.1.1.3 Invasive, non-native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

8.1.1.5 Invasive, non-native animals and plants increase the risk of introduction and transference of diseases

8.1.1.6 Invasive, non-native plants may create physical barriers for some species.

8.1.2 Invasive non-native aquatic animals (Avg. Score: 2.00)

NJ Specific Threats:

8.1.2.2 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminishing habitat suitability and reducing ecological integrity of natural communities, and may introduce disease into a population.

8.1.3 Invasive non-native aquatic plants (Avg. Score: 2.00)

NJ Specific Threats:

8.1.3.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.4 Invasive non-native terrestrial/wetland animals (Avg. Score: 1.00)

NJ Specific Threats:

8.1.4.1 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.4.2 Free-roaming and feral domestic animals such as cats and dogs causes direct mortality of wildlife and disturbance to wildlife breeding and resting areas.

8.1.5 Invasive non-native terrestrial/wetland plants (Avg. Score: 1.00)

NJ Specific Threats:

8.1.5.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.6 Invasive non-native fungal/bacterial diseases (Avg. Score: 2.00)

NJ Specific Threats:

8.1.6.1 The introduction of non-native fungal and bacterial diseases threatens native populations and ecosystems.

8.2 Problematic Native Species/Diseases

8.2.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.2.1.2 Invasive pathogens and insects may increase in range and abundance as limiting factors (such as temperature) are altered as a result of climate change.

8.2.1.3 Invasive, native species can out-compete non-invasive species for resources (food, light, shelter), leading to the demise of some species populations.

8.2.1.4 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.2.2 Named Species (Avg. Score: 2.00)

NJ Specific Threats: 8.2.2.2 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.4 Problematic Species/Diseases of Unknown Origin

8.4.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.4.1.1 Non-native or poorly understood diseases and parasites could potentially impact native animals.

8.4.2 Named Species (Avg. Score: 1.00)

NJ Specific Threats: 8.4.2.2 Diseases of unknown origin, such as snake fungal disease and Ranavirus, can cause significant mortality among native animal populations.

8.5 Viral/Prion-induced Diseases

8.5.1 Unspecified Species (Disease) (Avg. Score: 1.00)

NJ Specific Threats: 8.5.1.1 There is a large knowledge gap regarding the existence of, or potential for, other diseases impacting native wildlife.

8.5.2 Named Species (Disease) (Avg. Score: 1.00)

NJ Specific Threats: 8.5.2.1 Diseases such as West Nile Virus, arenavirus, sudden oak death, Avian Influenza, and snake fungal disease cause morbidity or mortality to native populations.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.1 Domestic and Urban Waste Water

9.1.1 Sewage (Avg. Score: 2.00)

NJ Specific Threats: 9.1.1.1 Degradation of aquatic and marine water quality and habitats by changing turbidity, flow and water chemistry.

9.1.1.2 Leads to increased eutrophication and algae blooms that result in oxygen depletion.

9.1.1.3 Contaminants in sewage treatment effluents and Combined Sewer Overflows can cause developmental and behavioral abnormalities and reproductive failure in wildlife.

9.1.2 Run-off (Avg. Score: 2.00)

NJ Specific Threats: 9.1.2.1 Chemical fertilizers and nutrient run-off changes the pH in streams and ponds and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.1.2.2 Contaminants degrade aquatic and marine water quality and can bioaccumulate in benthic organisms, threatening wildlife by causing developmental and behavioral abnormalities and reproductive failure.

9.1.2.3 Contaminants from road runoff (oil, sediment, salt, etc.) impact native vegetation and the species that rely upon them, degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2 Industrial and Military Effluents

9.2.1 Oil Spills (Avg. Score: 2.00)

NJ Specific Threats:

9.2.1.1 Oil spills render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.1.2 Oil spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.1.3 Oil spills cause external oiling of wildlife and ingestion of oil, both of which can injure or kill wildlife.

9.2.2 Seepage from Mining (Avg. Score: 2.00)

NJ Specific Threats:

9.2.2.1 Contaminants from mining degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2.3 Other (Avg. Score: 2.00)

NJ Specific Threats:

9.2.3.1 Point and nonpoint source pollution such as polychlorinated biphenyls (PCBs), pesticides, heavy metals, and endocrine disrupting compounds (EDC's) into freshwater and marine systems pose threats to wildlife through direct contact and/or ingestion, and to aquatic species and their predators through bioaccumulation, impacting the reproductive success and neurological function of many avian and fish species.

9.2.3.2 Chemical spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.3.3 Chemical spills may render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.4 Other: Hydrofracturing (Avg. Score: 1.00)

NJ Specific Threats:

9.2.4.1 Contaminants from hydrofracturing degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2.4.2 Uncontrolled effluents escaping from hydrofracturing facilities can cause injury to wildlife and alter normal behaviors.

9.2.5 Other: Industrial toxic settling ponds (Avg. Score: 2.00)

NJ Specific Threats:

9.2.5.1 Surficial or open industrial effluent ponds can cause injury or death to wildlife that become exposed through ingestion or submersion.

9.3 Agricultural and Forestry Effluents

9.3.1 Nutrient Loads (Avg. Score: 2.00)

NJ Specific Threats:

9.3.1.1 Chemical fertilizers and nutrient run-off changes the pH in streams, ponds and wetlands and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.3.1.2 Animal waste degrades terrestrial and aquatic habitats, especially streams, ponds and wetlands, resulting in eutrophication, which disrupts oxygen and nutrient balances, and causes injury and mortality to aquatic organisms.

9.3.1.4 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades wetland and aquatic habitats with runoff, increasing sediment and nutrient loads and pH.

9.3.1.5 Conversion of native forests to plantations degrades wetland and aquatic habitats through increased runoff.

9.3.2 Soil Erosion and Sedimentation (Avg. Score: 1.00)

NJ Specific Threats: 9.3.2.1 Soil erosion, sedimentation and destruction of streambanks and riparian buffers degrade waters making them unsuitable for riparian-dependent wildlife.

9.3.2.3 Conversion of native forests to plantations degrades wetland and aquatic habitats through increased sedimentation.

9.3.3 Herbicides and Pesticides (Avg. Score: 1.00)

NJ Specific Threats: 9.3.3.1 Pesticides degrade terrestrial and aquatic habitats, especially streams, ponds and wetlands. Aquatic wildlife are particularly sensitive to these contaminants, which can cause developmental and behavioral abnormalities and reproductive failure. Some contaminants may bioaccumulate in predatory fish and birds and disrupt reproduction.

9.3.3.3 Use of pesticides can directly harm non-target species through direct contact and/or by reducing and/or contaminating their food supply.

9.3.4 Other (Avg. Score: 1.00)

NJ Specific Threats: 9.3.4.1 Spills, leaks or discharges of fuel, oil or other contaminant fluids from machinery or equipment used in the normal course of agricultural or forestry activities can degrade or destroy adjacent aquatic and terrestrial habitats and/or cause harm to non-target species (plants and animals).

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture (Avg. Score: 1.00)

NJ Specific Threats: 9.3.5.4 Improper use of current insecticides, such as those containing esfenvalerate, prallethrin, or piperonyl butoxide, or past use of pesticides containing chlordane still present in the soils, are toxic to various wildlife species, and can cause injury, mortality, or other effects that impair population viability.

9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.4 Garbage and Solid Waste

9.4.1 Direct hazards to wildlife (Avg. Score: 1.00)

NJ Specific Threats: 9.4.1.1 Wildlife may ingest garbage causing choking or impingement in the digestive system, or they may become physically entangled in it (e.g., plastic or abandoned fish nets); conditions that make them unable to feed or drink, cause them to suffocate or drown, or otherwise restrict the animal's movement making them more susceptible to predators, starvation or injury.

9.4.1.2 Garbage and solid waste destroys natural habitats and obstructs wildlife movements.

9.5 Air-Bourne Pollutants

9.5.1 Acid Rain (Avg. Score: 1.00)

NJ Specific Threats: 9.5.1.1 Causes acidification of water bodies, resulting in changes to aquatic and marine communities and reducing biodiversity, and creating conditions that are unsuitable for some aquatic (freshwater and marine) and semi-aquatic species that are sensitive to pH shifts.

9.5.6 Herbicides and Pesticides (Avg. Score: 2.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

9.6 Excess Energy

9.6.2 Thermal Pollution (Avg. Score: 1.00)

NJ Specific Threats: 9.6.2.2 Water temperature changes to aquatic systems can deter or preclude use by SGCN (e.g., alter habitat suitability for wildlife species, reduce prey base) or present stressors that are harmful if not fatal to wildlife.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 1.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.2 Droughts

11.2.1 Droughts (Avg. Score: 2.00)

NJ Specific Threats: 11.2.1.1 Contribute to hardened soils, decreasing water recharge during rains and increasing the likelihood of flash floods during storms.

11.2.1.2 Lead to lower groundwater levels and therefore, less available water for people and habitats.

11.2.1.3 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

11.3 Temperature Extremes

11.3.1 Temperature extremes (Avg. Score: 2.00)

NJ Specific Threats: 11.3.1.1 Increasing temperatures may cause habitat loss and degradation by desiccating and/or raising the temperatures of small wetlands and streams leading to the loss of freshwater mussels and other aquatic species and species reliant upon these habitats.

11.3.1.2 Increased temperatures can negatively impact wetland, riverine, lacustrine and vernal pool-associated or -dependent wildlife by reducing flows, increasing water temperatures, lowering water levels and causing premature drying of vernal habitats.

11.3.1.4 Extremely low temperatures and/or extensive periods of unseasonably low temperatures during critical life history stages (e.g., hibernation, gestation/nesting) can alter animals' behaviors and decrease survivorship.

11.4 Storms and Flooding

11.4.1 Storms and flooding (Avg. Score: 1.00)

NJ Specific Threats: 11.4.1.1 Extreme storms and flooding events threaten aquatic and marine wildlife through habitat degradation and alteration, including alterations to off-shore or back-bay benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic and marine wildlife.

11.4.1.3 Increase risk of saltwater intrusion to freshwater habitats altering the water chemistry and potentially altering aquatic wildlife community.

11.4.1.4 Flood events alter river or stream morphology, benthic conditions and habitat availability for wildlife, cause bank erosion, and deposit sediments in floodplain wetlands altering wildlife habitat.

11.4.2 Increased rainfall (Avg. Score: 1.00)

NJ Specific Threats: 11.4.2.1 Extreme rain events threaten aquatic wildlife through habitat degradation and alteration, including alterations to benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic wildlife.

11.4.2.2 Extreme rain events can damage wildlife nesting and resting habitats, including impacts to avian eggs and chick and small mammal survivorship.

11.4.2.3 More frequent rain events can alter terrestrial and wetland vegetation communities as well as wetland hydrology, shifting wildlife community use.

11.6 Phenology Shifting or Alteration

11.6.2 Phenology shifts related to predator-prey ecology (Avg. Score: 1.00)

NJ Specific Threats: 11.6.2.1 Alters inter-specific relationships (e.g., competition, parasitism, predation) of wildlife, ultimately leads to detrimental impacts on the ecological system.

11.6.2.2 Shifts timing of species migration, breeding and hibernation, and available food resources, causes redistribution of species, or mortality for species that are unable to relocate due to their already isolated habitat or limited mobility.

11.6.3 Phenology shifts related to species redistribution (Avg. Score: 1.00)

NJ Specific Threats: 11.6.3.1 Shifts in timing of species migration, breeding and hibernation, and available food resources, as a result of wildlife range shifts driven by climate change.

11.6.3.2 Shifts in nesting times or egg incubation durations can limit nest success and longterm populations.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 2.00)

NJ Specific Threats: 12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.2 Lack of up-to-date existing information (Avg. Score: 2.00)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.3 Need to answer research question (Avg. Score: 2.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.4 Need to develop new technique (Avg. Score: 2.00)

NJ Specific Threats: 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 1.00)

NJ Specific Threats: 12.3.0.3 Lack of a licensing program and standards for NJ Nuisance Wildlife Control Operators (NWCOs) leads to inadequate controls over handling of wildlife and lack of reporting of non-game/SGCN species (and all wildlife) encountered in nuisance situations.

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 1.00)

NJ Specific Threats: 12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 2.00)

NJ Specific Threats:

14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 2.00)

NJ Specific Threats:

14.2.1.1 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various forest management practices.

14.2.1.2 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various aquatic and riparian management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 1.00)

NJ Specific Threats:

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.6 Secure and promote the protection/restoration of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers through incentive programs.

1.2.1.7 Secure and promote the protection/restoration of fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.12 Create incentives (non-monetary and/or monetary) for land developers to redevelop abandoned areas (e.g., shopping centers, office complexes) to minimize the loss of natural habitats and reduce the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

1.2.1.18 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and land managers to control and reduce the impacts of invasive, native and non-native species in order to increase structural habitat diversity.

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

2 Direct Management of Natural Resources

2.2 Dam and barrier removal

2.2.1 Culvert work

2.2.1.1 Replace existing barriers to wildlife movement with and/or install appropriately-sized systems to accommodate wildlife dispersal.

2.3 Fire management

2.3.3 Prescribed burning

2.3.3.1 Evaluate different management techniques of prescribed burns that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

2.6 Hazard or infrastructure removal

2.6.6 Shoreline armoring removal

2.6.6.1 Remove shoreline armoring to reduce its impacts on aquatic habitats.

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.5 Implement biologically safe and appropriate control/management strategies, and where appropriate, eradication strategies to reduce the impacts and/or limit the distribution of invasive and/or non-native plant species within or near aquatic systems using methods that will provide the most protection to the aquatic and riparian ecological system, and minimize disturbance to the soil and wildlife. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.8.0.6 Implement long-term management of invasive and/or non-native plants to help maintain functioning ecological systems and biological diversity, and to enhance travel corridors. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.3 Restore and/or enhance habitats to benefit urban-associated SGCN.

2.10.0.4 Restore and/or enhance suitable travel corridors connecting conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.8 Protect significant natural and/or unique communities by implementing best management practices when conducting habitat restoration strategies.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.12 Create and/or maintain scrub-shrub habitats through revegetation efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.15 Restore and/or enhance terrestrial and aquatic habitats proximate to but not adjacent to roads and other transportation corridors for terrestrial-bound SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.10.0.21 Restore and/or enhance understory habitats that suppress invasive species and provide critical resources and enhance sheltering, foraging, and nesting cover for wildlife.

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.10.0.23 Restore and/or enhance roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

2.10.0.24 Use NJ's CHANJ mapping and guidance to establish vegetation and enhance or create corridors between fragmented habitats with similar vegetation, slope, soils, structure, etc. to ensure vegetative integrity is maintained to allow wildlife to safely disperse, and corridors are buffered with natural habitats to minimize disturbance to wildlife within the corridors.

2.10.0.25 Enhance SGCN fish habitats through aquatic and riparian vegetation restoration.

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.3 Create suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats through vegetation management.

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through vegetation management.

2.11.0.6 Reclaim degraded rare species habitats by conducting vegetation management needed to restore habitat value for the documented/target SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.8 Maintain, enhance and/or restore biologically appropriate buffers for SGCN-inhabited/used freshwater wetlands through vegetation management.

2.11.0.13 Implement best management practices (BMPs), protective strategies, and guidelines for vegetation management to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.11.0.14 Conduct vegetation management adjacent to roads for SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.11.0.16 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.11.0.21 Minimize the degradation, alteration and/or changes in hydrology of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and subsequent disturbances to and behavioral changes of wildlife by maintaining or enhancing these areas and biologically appropriate buffers through habitat management and/or revegetation or restoration efforts.

2.11.0.23 Implement appropriate habitat management actions in areas where natural disturbances, such as wildfire, have been precluded.

2.11.0.24 Conduct vegetation management adjacent to aquatic habitats following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.26 Conduct vegetation management along roadsides and medians, avoiding peak activity periods for wildlife, that enhances wildlife dispersal naturally and safely across roads and similar barriers to/between terrestrial and/or aquatic habitats.

2.11.0.28 Conduct vegetation management in agricultural areas following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.29 Conduct vegetation management on transportation and service corridors (i.e., rights-of-way) following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.30 Identify and prioritize areas where various management tools (such as increasing salinity through the management of water levels or chemical applications) may be effective in reducing phragmites within and restoring marsh habitat.

2.11.0.32 Increase structural habitat diversity around and when feasible, within agricultural landscapes by managing vegetation for a variety of species, in particular, those farms that have removed scrub-shrub habitat and/or fragmented forests, and by implementing ecologically best practices (e.g., no-till farming, maintaining hedgerows, buffer set-asides, etc.).

2.11.0.33 Increase structural habitat diversity by implementing long-term vegetation management to minimize the potential for the establishment of invasive and/or non-native plants that may outcompete native vegetation.

2.11.0.34 Increase structural habitat diversity by managing residential, commercial and recreational areas' landscapes for a variety of species. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.35 Increase structural habitat diversity by managing vegetation adjacent to aquatic habitats in a manner that provides a buffer from runoff and erosion and a microclimate to stabilize seasonal temperatures to benefit a variety of aquatic and semi-aquatic species.

2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.

2.11.0.37 Increase structural habitat diversity by minimizing the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats which benefits wildlife.

2.11.0.38 Increase structural habitat diversity in and around horse/livestock farms by managing vegetation for a variety of species, in particular, in and around farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

2.11.0.39 Increase structural habitat diversity in and around solar farms by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.40 Increase structural habitat diversity surrounding areas used for energy, mining, and transportation and service corridors by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides, and avoid managing habitat during the breeding seasons for ground-nesting birds, reptiles, amphibians and small mammals.

2.12 Water management

2.12.7 Waterfowl impoundment maintenance

2.12.7.1 Manage impoundments to benefit SGCN species inhabiting them (e.g., bitterns, rails, ducks, turtles and some invertebrates).

2.12.7.2 Use impoundment management to create feeding and roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

2.12.7.3 Implement best management practices (BMPs), protective strategies, and guidelines for impoundment management to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.12.7.4 Implement impoundment management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimizes harm to wildlife, particularly SGCN.

2.12.7.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through impoundment management.

2.12.7.6 Reclaim degraded rare species habitats through impoundment management needed to restore habitat value for the documented/target SGCN.

2.12.7.7 Protect significant natural and/or unique communities by implementing best management practices for impoundment management.

2.12.7.8 Repair impoundments damaged by salt hay farm/dike abandonment and conduct restoration of degraded sites for targeted SGCN species and their habitats.

2.12.7.12 Implement impoundment management to benefit urban-associated SGCN.

2.12.7.13 Manage impoundments adjacent to roads for SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., marsh birds, amphibians, turtles, small mammals).

2.12.7.14 Prevent or ameliorate near-term impacts of climate change throughout the State but in particular within the coastal and Delaware Bay areas by implementing habitat management strategies that will establish/improve habitat resilience, such as impoundment management, that benefits wildlife inhabiting these areas.

2.13 Wildlife damage management

2.13.0 Nuisance fish and wildlife damage

2.13.0.5 Investigate the impacts of human-subsidized and/or naturally occurring predator species on SGCN to assess the need for integrated wildlife damage management techniques (e.g., predator exclosures, fish blockages, electric fence, culls) and/or policy changes on state land management that minimize the impacts of human-subsidized predators.

2.13.0.8 Implement and assess management strategies to control and reduce the impacts of detrimental species and diseases that pose threats to native wildlife or communities.

2.14 Wildlife disease management

2.14.0 Wildlife disease strategy development and investigation

2.14.0.1 Investigate diseases/pathogens impacting SGCN and/or their habitats.

2.14.0.2 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

2.14.0.3 Protect SGCN from exotic pathogen introduction or incident through implementation of a "rapid response plan"; DFW to give priority attention to these species in planning and/or implementing a response.

2.14.0.4 Conduct long-term monitoring of diseases in vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts.

2.14.0.5 Assess the impacts of diseases on the life cycles of wildlife.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.6 Conduct long-term studies on resident and migratory SGCN to determine if there are changes to the populations' demography (productivity, survival, dispersal) and/or to their critical and/or supporting habitats (i.e., diminishing in value, acreage or connectivity, etc.), in particular changes that would not maintain SGCN at viable levels for species populations. Update data and GIS maps; provide updated information to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.11 Develop, implement and evaluate the effectiveness of town plans that avoid impacts to SGCN species and their habitats.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.14 Identify areas with invasive, aquatic plants and animals and collect a detailed baseline assessment of the species' status and distribution. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort. Researchers and contractors performing Forest Stewardship Inventories and/or Plans on state lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.0.0.19 Identify the presence and status (e.g., functioning, structure, slated for removal, etc.) of existing dams and culverts within and/or that may impact SGCN and their habitats, and create a database that includes a GIS component identifying the locations of such structures and their status. Share this information with appropriate organizations and/or agencies evaluating the benefits and risks of such structures on SGCN and their habitats.

3.0.0.20 Once baseline data identifying and describing the status of existing dams and culverts have been gathered, conduct evaluations at a variety of sites to determine whether the benefits of culvert and dam creation or removal outweigh the risks to SGCN species and their habitats, and if other variables/conditions specific to individual sites/locations result in a different outcome. Identify and target appropriate dams and culverts for removal and/or reconstruction to minimize harm to SGCN species and their habitats.

3.0.0.23 Identify (through wildlife and aquatic system surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and research water quality parameters for all [types of] aquatic systems for various SGCN populations.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.2 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.0.3 Survey for and monitor populations of freshwater aquatic focal SGCN to assess the populations' demography, trends, condition, distribution, etc.

3.2.0.4 Conduct long-term monitoring of the impacts of contaminants to vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.2.0.5 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

3.2.0.6 Develop, implement and conduct studies to evaluate the effectiveness of methods implemented to reduce road mortality of wildlife (e.g. wildlife underpasses, road closures).

3.2.0.7 Track (via a database that includes a GIS component) and research problematic species and diseases to determine their distribution, impacts on SGCN wildlife/wildlife communities, and develop potential control measures.

3.2.0.8 Implement and conduct long-term monitoring of control measures aimed at minimizing the impacts of problematic species and/or diseases to evaluate the effectiveness of such efforts and to identify and incorporate additional strategies as appropriate.

3.2.0.9 Maintain an inventory of invasive insect distribution and where they exist, conduct long-term monitoring of habitat conditions to assist in developing strategies to combat the impacts to SGCN habitats. Report potential infestations to NJ DEP.

3.2.0.10 Evaluate the effectiveness of sanitation/decontamination protocols in minimizing the transference of wildlife diseases and invasive plant species.

3.2.0.11 Investigate the impacts of ORV use as a mechanism to spread wildlife diseases and invasive plant species to native wildlife and habitats. Integrate this information when mapping undeveloped roads and trails to identify potentially sensitive areas in northern NJ forests.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.2 Age, size and sex structure

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.3 Baseline inventory

3.2.3.5 Investigate and develop strategies to reduce "by-catch" of SGCN and other non-target species. Present findings and strategies to NJ DEP and conservation organizations for review and possible implementation. Develop a database documenting by-catch for use in management planning decisions.

3.2.3.7 Identify roads or portions of roads, paved or unimproved (through site surveys, land use/land cover assessments and analyses, review of available data, enlistment of species experts, etc.) with high incidences of road mortality and/or presence of snakes, turtles, medium-sized and large mammals. Conduct assessments of the roads and incorporate information into a database that includes descriptions (e.g., qualifiers to help prioritize the roads' risk to wildlife) and a GIS component of the locations of such areas. Share this information with appropriate organizations and/or agencies working to implement measures (e.g., wildlife passages, road closures) to minimize the risk to these species.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.6 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) that could, through revegetation and/or enhancement efforts, become suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN.

3.3.1.16 Gather "best information" for spatial modeling and update/create a current model/depiction of anticipated habitat shifts from sea-level rise, flooding, etc.

3.3.1.17 Identify and map undeveloped roads and trails in all conserved forests, and create a database of locations. Integrate information regarding potentially sensitive areas.

3.3.1.19 Identify and codify legal ORV access areas on state (and if appropriate, other conserved) lands. Provide GIS mapping to the landowner for potential use in directing such recreational activities.

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.1.26 Survey all historic locations and unsurveyed suitable habitats to identify populations of freshwater aquatic focal species.

3.3.2 Monitoring

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.4 Protect water quality and aquatic-dependent species by appropriately designating Category 1 waters and enforcing protective regulations. Seek appropriate classifications for stream segments based on Endangered and Threatened Status and/or the Index of Biotic Integrity (IBI) results that do not fulfill Category One requirements.

3.3.2.5 Conduct long-term monitoring of water quality of SGCN aquatic habitats (and aquatic systems feeding into those habitats) to evaluate protection and management efforts to reduce, if not eliminate, chemical contamination, siltation, eutrophication, and other forms of pollution/contamination of aquatic systems.

3.3.2.8 Evaluate the effectiveness of current prescribed burning practices on Pinelands dependent species.

3.3.2.11 Evaluate and compare the effectiveness of delayed mowing of warm season grass fields versus cool season hay fields to benefit grassland-dependent species.

3.3.2.13 Evaluate the effectiveness of management strategies (e.g., timing restrictions for mowing, cooperative agreements with utility companies for maintenance of rights-of-ways) that maintain and enhance large existing areas of grassland in perpetuity. Focus on habitat patches that can be managed to enhance the total size of suitable grassland habitat and create interspersed early-successional habitat.

3.3.2.14 Research and evaluate the effectiveness of water quality management practices on water-dependent and semi-dependent SGCN, particularly those practices associated with permitting or mitigation actions.

3.3.2.15 Investigate the effectiveness of management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.8 Develop best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5.3.9 Develop strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.14 Develop aquaculture practices in the coastal areas that are compatible with the recovery of SGCN.

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.3.16 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.3.19 Work with foresters to develop prescribed burning practices for Pinelands dependent species that increase or maintain habitat quality for these species in the Pinelands.

3.5.3.22 Identify (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) and modify management strategies (e.g., timing restrictions for mowing, cooperative agreements with utility companies for maintenance of rights-of-ways), based on research, that maintain and enhance large existing areas of grassland in perpetuity.

3.5.3.23 Revise water quality management practices based on research on water-dependent and semi-dependent SGCN, particularly when associated with permitting or mitigation actions.

3.5.3.24 Based on research, modify management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.3.27 Conduct an assessment and develop a location list of available equipment for boom deployment during oil spills.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.2 Develop, implement, monitor and evaluate management strategies to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

3.5.4.5 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

3.5.4.9 Conduct studies to evaluate the impacts of roads on SGCN and develop, implement and conduct studies to evaluate the effectiveness of methods to reduce road mortality of wildlife (e.g. wildlife underpasses, road closures).

3.5.4.12 Investigate and develop strategies to reduce "by-catch" of SGCN and other non-target species. Present findings and strategies to NJ DEP and conservation organizations for review and possible implementation. Develop a database documenting by-catch for use in management planning decisions.

3.5.4.13 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.17 Investigate new, non-invasive techniques for SGCN population evaluation through literature review, expert opinion, trial studies (if low risk), etc.

3.5.4.18 Investigate the effectiveness of survey techniques through selected “ground truthing” and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

3.5.4.21 Develop BMPs to address problematic species and diseases of unknown origin.

3.5.4.22 Investigate the efficacy of implementing strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities.

4 Education

4.1 Educator/Instructor training

4.1.0 Public education

4.1.0.1 Provide educational resources and training programs to private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

4.1.1 Aquatic resource education

4.1.1.1 Provide educational resources and training programs to teachers in aquatic resource education that includes information regarding climate change and sea-level rise for incorporation into the class curriculum and/or as the focus of school field trips.

5 Facilities and Areas

5.15 Wildlife Management Areas

5.15.6 Roads

5.15.6.1 Clearly post areas/roads where vehicle access is permitted.

5.15.6.2 Clearly post areas/trails where vehicle access is not permitted.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.3 Secure and protect riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.4 Secure and protect fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.6 Secure and protect old-growth forest stands with large trees and/or stands that are approaching or being actively managed for old growth forests, in particular those within large, contiguous forest tracts, through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.8 Secure and protect scrub-shrub habitats for SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.1 Promote the protection of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates and enhance these lands by increasing the effective size through conservation area designations of stopover habitats and adjacent private lands.

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.3 Increase the protection of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through conservation area designations.

6.3.0.4 Promote the protection of fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through conservation area designations.

7 Law Enforcement

7.1 Law enforcement

7.1.3 Sub-national Level

7.1.3.2 Increase the number of law enforcement officers tending to wildlife issues to a reasonable number to sufficiently cover the State and marine waters.

7.1.4 Scale Unspecified

7.1.4.1 Improve enforcement of policies and/or regulations that promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

7.1.4.6 Recruit law enforcement to assist in the protection and enhancement of SGCN populations, in particular endangered species, through improved awareness of species through trainings, partnerships, and other methods. Information should include but is not limited to: 1) Issues concerning illegal collection of reptiles, 2) Persecution of rare snakes, 3) Illegal recreational activities on public lands (e.g., off-road vehicles) and their impact on wildlife, 4) Identification of sensitive areas, critical sites and/or "hot-spots" for collection.

7.1.4.7 Increase law enforcement presence to enforce regulations governing recreational activities (e.g., the use of personal watercraft and off road vehicles, caving, rock climbing, etc.) on conserved lands and within other sensitive habitats, and discourage activities that cause harm or disturbance to vegetation, wetlands, fish and wildlife.

7.1.4.9 Implement policies that improve and secure habitat connections between conserved SGCN habitats.

7.1.4.10 Implement policies that promotes expanding acreages and enhances the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.16 Implement policies that protect and restore riparian areas.

7.1.4.17 Improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

7.1.4.20 Implement policies and/or regulations with the objective of reducing "by-catch" of SGCN and other non-target species.

7.1.4.23 Implement policies that minimize wildlife road mortality.

7.1.4.24 Implement protective measures to benefit urban-associated SGCN such as restricting human access, buffering sensitive areas with postings, noise and/or light restrictions in sensitive areas and/or during sensitive periods such as breeding, etc.

7.1.4.26 Educate law enforcement personnel that there may be unauthorized research projects taking place and to encourage them to investigate any activities that appear to be harmful to wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.2 Develop a team of personnel from government entities, conservation organizations and other stakeholders engaged in oil/gas spill response for marine and freshwater habitats to develop a feasible plan for oil spill response and/or to amend NJ's current oil spill response plan that clearly outlines each organizations responsibilities and an assessment and location list of available equipment for boom deployment during oil spills.

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.1.0.4 Engage government agencies, conservation partners and other stakeholders in constructive dialogues encouraging them to influence policy change and the creation of incentives through a habitat bill and/or municipal ordinances for backyard habitat.

8.1.0.8 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting sportsmen's organizations and fisheries addressing the potential effects of over-harvesting wildlife and promote "catch and release".

8.1.0.10 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting sportsmen's organizations and fisheries, as well as public constituents, addressing the potential impacts of over-harvesting wildlife can have on the ecological system and to promote "sustainable harvest".

8.1.0.11 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting sportsmen's organizations and fisheries, as well as public constituents, addressing the unintended effects abandoned fishing gear, tackle and crab pots can have on wildlife, and promote the collection and/or reporting of abandoned items and their locations.

8.1.0.12 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting sportsmen's organizations and fisheries, as well as public constituents, addressing the unintended effects fishing gear and tackle can have on wildlife.

8.1.0.13 Engage DOD in a constructive dialogue regarding strategies to minimize disturbances to all SGCN (i.e., beyond their federal requirements) from forest management and other practices on their lands.

8.1.0.14 Engage DOD in a constructive dialogue regarding strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities.

8.1.0.15 Engage government agencies, conservation partners and other stakeholders in discussions encouraging and supporting the creation of laws and policies requiring vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

8.1.0.16 Engage local governments in discussions regarding the importance of them adopting/passing ordinances which require assessing and addressing secondary impacts (i.e., ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

8.1.0.18 Engage NJDOT, NJ Transit Authority and other road management entities, wildlife conservation organizations/agencies (e.g., Division of Fish and Wildlife, New Jersey Conservation Foundation, Conserve Wildlife Foundation of NJ), and communities and citizens in discussions regarding the importance of and methods to enhance habitat connectivity, and work together to develop feasible strategies for ensuring that wildlife can disperse naturally and safely across roads and similar barriers to terrestrial and/or aquatic habitats.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.21 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation human-subsidized and/or overabundant, native species cause to local nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.22 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation invasive species cause to native nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.33 Engage government agencies, conservation partners and other land managers, communities, landowners, and commercial and industrial stakeholders in discussions regarding the importance of protecting and methods to protect priority wetlands beyond the levels afforded through regulation by maintaining and/or restoring optimal biological buffers around wetlands.

8.1.0.34 Work with the NJ Education Association and Department of Education to design curriculum and outdoor experimental learning opportunities, and provide training to teachers on implementation of these activities.

8.1.0.37 Enlist landowners and NJ citizens in the protection of and survey efforts for SGCN, in particular rare species, by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management and wildlife-related volunteer programs.

8.1.0.40 Encourage researchers, land managers, naturalists and enthusiasts to follow proper procedures for the coordination and/or permitting of research/management activities involving wildlife and sensitive habitats, and discourage activities that alter vegetation or wetlands, or cause harm or disturbance to wildlife.

8.1.0.42 Engage citizens, wildlife observers and photographers through discussions and distributable information regarding the importance of and encouraging implementing responsible and ethical behavior when observing wildlife by developing an alliance of wildlife photographers and widely circulating recommendations on how to reduce impact.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.2 Utilize WSFR grant funds, in combination with alternate funding sources as needed, to implement an extensive educational/outreach program consisting of displays, fliers, list-serve mailings, Facebook posts and speaking engagements with sportsmen's organizations and fisheries, as well as public constituents, addressing the unintended effects fishing gear and tackle can have on non-target species.

8.3.0.3 Utilize WSFR grant funds, in combination with alternate funding sources as needed, to implement catch and release outreach program(s).

8.3.0.4 Utilize WSFR grant funds, in combination with alternate funding sources as needed, to implement an extensive educational/outreach program consisting of displays, fliers, list-serve mailings, Facebook posts and speaking engagements with sportsmen's organizations and fisheries addressing the unintended effects abandoned fishing gear, tackle and crab pots can have on wildlife.

8.3.0.7 Develop and provide (or otherwise make publicly available) educational programs and/or materials that describe the negative impacts of off-road vehicles and watercraft use in and adjacent to critical SGCN habitats, and the importance of confining such activities to more appropriate locations and/or seasons.

8.3.0.8 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate recreationists and encourage landowners to eliminate garbage in the vicinity of suitable wildlife habitat, in particular SGCN habitat. Information should include the detrimental impacts garbage may have on various wildlife species.

8.3.0.9 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners and land managers to include only native plants in landscaping and restoration projects. Provide information to assist them in detecting problematic establishment of invasive, non-indigenous plants.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.14 Develop an educational outreach program using a variety of media to ensure maximizing the distribution of information, in particular targeting sportsmen's organizations and fisheries, regarding the unintended effects abandoned fishing gear, tackle and crab pots can have on wildlife, including non-target species.

8.3.0.15 Develop an educational outreach program for citizens regarding: 1) The impacts to wildlife as a result of plastic bags entering aquatic and marine systems, 2) The importance of decreasing the amount of plastic shopping bags in circulation, 3) The need for businesses to voluntarily charge for bags or reimburse people for using their own non-plastic bags, and 4) The need for their assistance through public pressure on legislators and government to pass legislation that that limits the amount of plastic shopping bags in circulation.

8.3.0.16 Develop an educational outreach program using a variety of media to ensure maximizing the distribution of information, in particular targeting sportsmen's organizations and fisheries, promoting "catch and release" and the impacts excessive harvests can have on wildlife populations.

8.3.0.17 Develop an educational outreach program using a variety of media to ensure maximizing the distribution of information, in particular targeting sportsmen's organizations and fisheries, promoting "sustainable harvest" using scientific data, and garner support from constituents through this outreach.

8.3.0.19 Develop an educational outreach program for the public on the devastating effects predators can have on native nesting wildlife.

8.3.0.22 Post signage in sensitive coastal habitats (e.g., bird and Diamondback Terrapin nesting areas) to educate the boating community on responsible use of these areas.

8.3.0.24 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

8.3.0.25 Develop educational outreach programs for landowners, nurseries and the general public regarding the negative impacts of invasive and non-native plants on our natural communities.

8.3.0.27 Develop educational outreach programs for public and private landowners and land managers regarding the importance of structural habitat diversity, methods to increase diversity, and/or incentive programs available to increase habitat diversity.

8.3.0.29 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about the importance of maintaining a vegetative buffer along riparian and aquatic habitats to intercept storm water runoff and minimize soil erosion.

8.3.0.30 Develop educational outreach programs for private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.4 Develop a plan that directs the creation of new impoundments and/or the expansion of bogs for cranberry farming within or immediately adjacent to critical forested habitats in a manner that minimizes impacts on the natural hydrology of the watershed and subsequently, the natural wetlands in the area.

9.1.0.5 Develop a plan that directs the creation or expansion of energy or utility rights-of-way in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.7 Develop a plan that directs the maintenance of or new channelization of forested streams and rivers in a manner that minimizes impacts of the aquatic ecological system and adjacent forest

9.1.0.8 Develop a plan that focuses on strategies for oil pipelines to avoid sensitive habitats that would be highly impacted by oil spills.

9.1.0.13 Develop a plan to minimize agriculture that would result in groundwater withdrawal in critical forested areas.

9.1.0.14 Develop a plan to minimize development that would result in groundwater withdrawal in critical forested areas.

9.1.0.15 Develop a plan to minimize fragmentation of terrestrial and aquatic habitats by roads.

9.1.0.16 Develop a plan to minimize new lawnscapes and preserve natural vegetation within and adjacent to critical forest areas.

9.1.0.18 Develop a plan to minimize the effects of road widening and traffic volume increases within critical wildlife habitat areas using CHANJ products.

9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

9.1.0.20 Develop a plan to minimize the impacts of existing agricultural properties adjacent to and the conversion of forest habitats (terrestrial and aquatic, within or adjacent to critical forests) to agriculture, grazing areas/livestock farms, and plantations.

9.1.0.21 Develop a plan to minimize the use of any-sized dam in critical forested areas.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.23 Develop a plan to mitigate the effects of transportation barriers by using CHANJ products.

9.1.0.24 Develop a plan to prevent livestock from entering water bodies in critical forested habitats.

9.1.0.25 Develop a plan to prevent the conversion of forested stream buffers to pastures in critical forested habitats.

9.1.0.27 Develop a plan to use wildlife-appropriate culverts in critical forested areas.

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.31 Develop wetland restoration plans that consider the life history and needs of wildlife occupying targeted habitats.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.2 Organizational strategic and CMS planning

9.2.1 Organizational strategic and operational planning

9.2.1.1 Identify and codify legal ORV access areas on state lands.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.5 Develop response plans to address disease outbreaks within wildlife populations, in particular SGCN.

9.3.1.6 Amend NJ's current oil spill response plan to 1) expand the geographic area addressed, 2) expand the targeted species impacted and in need of recovery, and 3) revise current and integrate new actions into the plan as needed.

9.3.1.7 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.10 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.1.12 Develop a management plan to benefit urban-associated SGCN based on research.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.15 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.1.16 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3 Habitat management planning

9.3.3.6 Develop a management plan for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

9.3.3.8 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.3.9 Develop a response plan to outbreaks using BMPs to control infestations and limit their spread in a way that avoids excessive harm to non-target species.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.3.13 Develop a management plan that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas and prevents or ameliorates near-term impacts of climate change throughout the State, but in particular within the coastal and Delaware Bay areas.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.16 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.3.17 Develop a management plan for prescribed burning that will benefit Pinelands dependent species and increase or maintain habitat quality for these species in the Pinelands.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.21 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.3.22 Create management plans to minimize and/or prevent wildlife road mortality that will incorporate wildlife passages in conjunction with barrier fencing and, where possible, seasonal closures. Aquatic-associated passages must avoid disturbance to the natural streambeds and riparian habitat, permit high volumes of water to flow freely, and provide adequate travel corridors for terrestrial wildlife, while maintaining stream flow for fish passage. Bridges that span rivers and streambeds and include floodplain habitat on either side of the span to provide travel corridors for terrestrial wildlife are preferred over culverts.

9.3.3.24 Develop a plan to improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

9.3.3.28 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.3.29 Develop habitat management plans aimed at reducing or eliminating negative impacts of ORVs.

9.3.3.32 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.3 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.9 Review strategies for creating or enhancing connectivity (e.g., installing appropriately-sized wildlife passages) between wetlands to allow wildlife to disperse naturally and safely.

11.1.1.10 Use CHANJ mapping in reviews of proposed energy, mining, transportation and utility service companies/agencies' projects to attempt to maintain habitat connectivity and reduce fragmentation, and identify potential impacts of the projects.

11.1.1.11 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed offshore energy projects relating to drilling, extraction and distribution of petroleum and gas products to reduce habitat destruction and minimize impacts on wildlife.

11.1.1.12 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed solar farm projects to reduce habitat fragmentation and minimize impacts on wildlife.

11.1.1.13 Use the best available science (species data, habitat present, wind farm layout options, wind blade impacts on migratory species, location of migration routes, etc.) when conducting regulatory reviews of proposed wind farm projects to minimize impacts on migratory and resident wildlife and reduce habitat fragmentation.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.2.2 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.2.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into the environmental review process to help establish policies and plans that minimize the impact of aquaculture on fish and wildlife.

11.1.2.4 Review strategies for creating or enhancing connectivity (e.g., installing appropriately-sized wildlife passages) between wetlands to allow wildlife to disperse naturally and safely.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.2 Provide technical support to public and private landowners and land managers for controlling invasive, native and non-native plant species in order to increase structural habitat diversity.

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.7 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on the importance of maintaining habitat connectivity, minimizing fragmentation, and the use of CHANJ products to help them target areas for such planning.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.14 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters), and to enhance or restore biologically appropriate buffers.

11.2.0.15 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and landowners about the importance of retaining and in an effort to protect, create, enhance and/or restore vegetation along aquatic habitats.

11.2.0.18 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats.

11.2.0.21 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates to promote the protection and/or enhancement of those adjacent habitats to increase the effective size of the migratory habitat.

11.2.0.22 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

11.2.0.23 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to SGCN habitats to promote the protection and/or enhancement of those adjacent habitats to increase the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and that connect conserved SGCN habitats.

11.2.0.24 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers on how to manage vegetated roadside areas (e.g., mowing, brush-hogging, etc.) on a schedule that avoids peak activity periods for wildlife and therefore, minimizes harm.

11.2.0.25 Provide educational resources, training programs, and on-the-ground guidance to resource managers regarding the assessment of and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) related to residential and commercial development.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.1 Engage partners and stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.3 Provide educational resources, training programs, and on-the-ground guidance to DOD to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop and implement forest management and other practices that minimize disturbances to SGCN (i.e., beyond their federal requirements).

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

100 Law and Policy

100. Legislation

100.1.3 Sub-national Level

100.1.3.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.3.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.4 County and Local

100.1.4.1 Enhance critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates through the local ordinances of adjacent private lands to increase the effective size of the habitat.

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.3 Expand the acreages and enhance the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN through local ordinances.

100.1.4.4 Secure wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and biologically appropriate buffers through local ordinances.

100.1.4.5 Secure SGCN-inhabited/used freshwater wetlands and biologically appropriate buffers through local ordinances.

100.1.4.11 Secure riparian areas through local ordinances.

100.1.4.13 Encourage municipal laws regulating domestic pets that may predate on wildlife.

100.1.4.14 Adopt/pass local ordinances which require assessing and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.5.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.5.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into state/local policy to minimize the impact of aquaculture on fish and wildlife.

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.1 Develop (and/or improve) policies and/or regulations that will promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

100.3.0.3 Develop policies that will promote the long term protection of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates.

100.3.0.5 Develop policies that will promote improved and secure habitat connections between conserved SGCN habitats.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.13 Develop policies that will promote protecting and restoring riparian areas.

100.3.0.14 Develop policies and/or regulations that increase the protective buffers of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) to biologically appropriate distances to benefit SGCN that rely upon these habitats and improve the function of the [associated] aquatic systems.

100.3.0.17 Develop and implement policies and/or regulations with the objective of reducing "by-catch" of SGCN and other non-target species.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.20 Develop policies and/or regulations that prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

100.3.0.21 Develop policies that minimize wildlife road mortality through: 1) Requiring the integration of wildlife passages into all new and repaired roads, in particular those areas that will connect SGCN habitats, 2) Requiring current fish/wildlife passages be improved and maintained in perpetuity, 3) Supporting seasonal road closures, in particular for unimproved roads, 4) Supporting projects that work to improve connectivity of SGCN habitats such as land conservation through acquisition or other means.

100.3.0.25 Amend the harvest quota or "bag limits" within the freshwater fish code relative to SGCN or sensitive game species' as needed.

100.3.0.26 Adopt regulations requiring the combined sewer overflow alternative analyses required by regulation address potential impacts to wildlife in watercourses or receiving water bodies.

100.3.0.27 Amend harvest, license and/or permit requirements to incorporate guidance regarding the use of gear and/or tackle and current best practices to minimize bycatch or entanglement of non-target species.

100.3.0.28 Amend harvest, license and/or permit requirements to require mandatory reporting by permittees/licensees of lost harvest gear, by-catch and, entanglement of non-target species.

100.3.0.29 Amend harvest, license and/or permit requirements to incorporate the exclusion devices and/or to require trap/pot designs with a quick-corrode feature which would render the device ineffective upon short-term sustained submersion.

100.3.0.31 Create or expand tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMPs.

100.3.0.36 Create legislation to limit the amount of plastic from shopping bags in circulation and re-instate incentives for citizens bringing their own shopping bag to grocery store.

100.3.0.40 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.

100.3.0.42 Fully adopt the former Storm water Management Rules' 300ft buffer requirements into the Flood Hazard Area Control Act Rules.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.48 Propose new State law or regulation mandating that a State-level "development impact fee" be assessed on all new development approved by municipalities (via the Municipal Land Use Law processes), and dedicate such monies to the development and implementation of regional Habitat Conservation Plans (or existing plans/programs serving the same regional function).

100.3.0.49 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address the issue of disturbance to habitat or species as a result of human activities (e.g., construction, bridge maintenance, road work, etc.).

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.53 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded rights-of-way corridors associated with energy transport/transmission.

100.3.0.54 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded surface mining areas.

100.3.0.57 Develop regulations that when implemented will improve and secure habitat connections between conserved SGCN habitats.

100.3.0.58 Develop regulations that when implemented will promote the expansion of acreages and enhancement of the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.64 Develop regulations that when implemented will protect and restore riparian areas.

100.3.0.66 Develop regulations with the objective of reducing "by-catch" of SGCN and other non-target species.

100.3.0.68 Develop regulations that when implemented will prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

100.3.0.69 Develop regulations that when implemented will minimize wildlife road mortality.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.2 Create a policy that requires the NJ DEP to incorporate scientific information regarding climate change and sea level rise (e.g., predictions, habitat management/acquisition efforts to enhance resilience to inundation) on their websites and to work with other government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

100.4.0.3 Develop policies for mandatory buffer strips on preserved farmlands and state-owned agricultural lands.

100.4.0.4 Create a policy that requires the use of wildlife habitat and corridor mapping products for both regulatory use when conducting project reviews and planning/siting new or expanded rights-of-way projects.

100.4.0.8 Develop a white paper addressing the impacts that existing, new or expanded rights-of-way have upon wildlife, wildlife habitats and habitat connectivity.

100.4.0.9 Develop and implement policies to minimize the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats in order to benefit wildlife.

100.4.0.12 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.4.0.13 Develop policies for different circumstances (e.g., roadsides and medians, riparian, aquatic and terrestrial habitats) that outline appropriate habitat/vegetation management strategies and schedules to minimize risks to and benefit wildlife.

100.4.0.16 Develop policies to implement habitat management strategies that will increase the structural diversity surrounding areas used for energy, mining, and transportation and service corridors which include but are not limited to the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-

100.4.0.19 Develop regulations that will minimize the creation of new barriers, remove or replace current barriers with appropriately-sized systems to accommodate wildlife dispersal, and to minimize road widening and traffic volume increases within critical wildlife habitat areas.

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.21 Ensure that Section 303(d) of the Clean Water Act and applicable State statutory/regulatory requirements for surface water pollutant budgets are being met by monitoring and enforcing regulatory Total Maximum Daily Load (TMDL) targets established within regional Water Quality Management Plans.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Longtail Salamander

Focal species that comprise this Conservation Target:

Longtail Salamander

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:

- 1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.1.1.2 Loss, alteration and/or degradation of habitat.
- 1.1.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.
- 1.1.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.
- 1.1.1.5 Impervious surfaces can lead to a decrease in water recharge.
- 1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.
- 1.1.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats:

- 1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.2.1.2 Loss, alteration and/or degradation of habitat.
- 1.2.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.
- 1.2.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.
- 1.2.1.5 Impervious surfaces can lead to a decrease in water recharge.
- 1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.
- 1.2.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats:

- 1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.3.1.2 Loss, alteration and/or degradation of habitat.
- 1.3.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.
- 1.3.1.4 Impervious surfaces can lead to a decrease in water recharge.

1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.3.1.6 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture (Avg. Score: 1.00)

NJ Specific Threats: 2.1.1.3 Conversion of agricultural landscape that results in increased erosion, runoff, and chemical and thermal pollution decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.1.2 Small-holder Farming (Avg. Score: 1.00)

NJ Specific Threats: 2.1.2.2 Fragments terrestrial and aquatic habitats.

2.1.3 Agro-industry (Avg. Score: 1.00)

NJ Specific Threats: 2.1.3.2 Fragments terrestrial and aquatic habitats.

2.2 Wood and Pulp Plantations

2.2.1 Small Holder (Avg. Score: 2.00)

NJ Specific Threats: 2.2.1.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.2.1.2 Tree harvesting can cause direct mortality to wildlife, especially if done during peak activity periods or vulnerable life stages (e.g., denning, nesting, gestation/birthing, basking, roosting, pre-volancy, etc.).

2.2.2 Agro-industry Plantations (Avg. Score: 1.00)

NJ Specific Threats: 2.2.2.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.2.2.2 Tree harvesting can cause direct mortality to wildlife, especially if done during peak activity periods or vulnerable life stages (e.g., denning, nesting, gestation/birthing, basking, roosting, pre-volancy, etc.).

2.3 Livestock Farming and Ranching

2.3.2 Small-holder Grazing (Avg. Score: 1.00)

NJ Specific Threats: 2.3.2.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.2.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

2.3.3 Agro-industry Grazing (Avg. Score: 1.00)

NJ Specific Threats: 2.3.3.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.3.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

3 Energy Production and Mining

3.1 Oil and Gas Facilities and Pipelines

3.1.1 Distribution processes of petroleum and other liquid hydrocarbons (Avg. Score: 2.00)

NJ Specific Threats: 3.1.1.1 Fragments terrestrial and aquatic habitats.

3.1.1.2 Loss, alteration and/or degradation of habitat.

3.1.1.3 Increased risk of oil spills.

3.1.1.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.

3.1.2 Natural gas distribution processes (Avg. Score: 2.00)

NJ Specific Threats:

3.1.2.1 Fragments terrestrial and aquatic habitats.

3.1.2.2 Loss, alteration and/or degradation of habitat.

3.1.2.3 Increased risk of gas leaks and explosions.

3.1.2.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.

3.2 Mining and Quarrying

3.2.2 Surface Mining - Rock Quarry (and sand quarries) (Avg. Score: 1.00)

NJ Specific Threats:

3.2.2.1 Fragments terrestrial and aquatic habitats.

3.2.2.2 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

3.2.2.3 Increased risk of vehicle strikes/mortality to wildlife.

3.3 Renewable Energy

3.3.1 Wind Power (Avg. Score: 1.00)

NJ Specific Threats:

3.3.1.2 Fragments terrestrial habitats.

3.3.1.3 Loss, alteration and/or degradation of habitat.

3.3.1.4 Increased commercial infrastructure.

3.3.2 Solar Power (Avg. Score: 1.00)

NJ Specific Threats:

3.3.2.1 Fragments terrestrial habitats.

3.3.2.2 Loss, alteration and/or degradation of habitat.

3.3.2.3 Increased commercial infrastructure.

3.4 Conventional Power Plants

3.4.0 Conventional Power Plants (Avg. Score: 1.00)

NJ Specific Threats:

3.4.0.2 Loss, alteration and/or degradation of habitat due to new or the expansion of current facilities.

3.4.0.3 Alteration of the temperature, pH and/or hydrology of aquatic ecosystems change plant communities and can harm wildlife and/or impact their behavior and survivorship.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:

4.1.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species and inhibiting dispersal of non-volant animals, reducing gene flow.

4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.1.2 Movement of cars and other vehicles on roads and railroads (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:

4.1.2.1 Increased vehicle traffic increases the risk of wildlife mortality from strikes.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads (Avg. Score: 2.00)

NJ Specific Threats:
- 4.2.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species, inhibiting dispersal of non-volant animals, reducing gene flow, and creating barriers to fish when service line-associated roads cross streams (e.g., bridges, culverts, fords, etc.).
- 4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.
- 4.2.1.4 Lines that cross or run parallel to streams result in a loss or reduction of vegetated riparian buffers and streamside shading, affecting water quality and in-stream habitat for aquatic biota.

4.2.2 Management of rights-of-way or communication tower facilities and/or their associated access roads (Avg. Score: 2.00)

NJ Specific Threats:
- 4.2.2.1 Improper or poorly scheduled vegetation management can cause direct mortality to and may reduce productivity of wildlife.

5 Biological Resource Use

5.1 Hunting and Collecting Terrestrial Animals

5.1.1 Intentional Use (Avg. Score: 1.00)

NJ Specific Threats:
- 5.1.1.1 Illegal collection of wildlife can have detrimental impacts on populations.

5.1.2 Unintentional effects (Avg. Score: 1.00)

NJ Specific Threats:
- 5.1.2.2 Disruption of normal wildlife behavior.

5.2 Gathering Terrestrial Plants

5.2.3 Control (Avg. Score: 1.00)

NJ Specific Threats:
- 5.2.3.3 Removal of riparian or near-stream vegetation alters water quality and in-stream habitat for aquatic organisms by reducing streamside shading, increasing bank erosion, and affecting the natural filtering ability of trees, shrubs, and grasses.

5.3 Logging and Wood Harvesting

5.3.1 Intentional Use (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats:
- 5.3.1.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.
- 5.3.1.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.
- 5.3.1.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.
- 5.3.1.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.
- 5.3.1.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.2 Intentional Use (large scale) (Avg. Score: 2.00)

NJ Specific Threats:
- 5.3.2.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.2.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.2.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.2.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.2.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.3 Unintentional effects (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.3.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.3.2 Poorly planned/implemented tree harvesting adjacent to waterways and vernal pools can lead to increased water temperatures, soil erosion and sedimentation, and reduces the potential for woody debris within the aquatic system, leading to negative impacts on wildlife.

5.3.4 Unintentional effects (large scale) (Avg. Score: 2.00)

NJ Specific Threats: 5.3.4.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4.2 Extensive infrastructure and larger equipment requirements present a potential risk of direct injury/mortality to wildlife.

5.3.4.3 Poorly planned/implemented tree harvesting adjacent to waterways and vernal pools can lead to increased water temperatures, soil erosion and sedimentation, and reduces the potential for woody debris within the aquatic system, leading to negative impacts on wildlife.

5.3.4.4 Infrastructure and/or equipment use may result in subtle changes to drainage patterns, adversely affecting vernal pool and wetland hydrology.

5.3.4.5 Lack of appropriate, sustainable forest management can lead to a decrease in forest habitat diversity, degraded habitat for many forest species, the loss of habitat for early-successional species, and/or the loss of unique habitats for species that need canopy breaks and multi-aged tree composition to fulfill various life history requirements.

5.4 Fishing and Harvesting of Aquatic Resources

5.4.1 Intentional Use (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.4.1.4 Illegal collection of aquatic and semi-aquatic wildlife can have detrimental impacts on populations.

5.4.2 Intentional Use (large scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.4.2.4 Illegal collection of aquatic and semi-aquatic wildlife can have detrimental impacts on populations.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized) (Avg. Score: 1.00)

NJ Specific Threats: 6.1.1.1 Inappropriate use of off-road vehicles creates new roads/trails which fragments habitat.

6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.

6.1.1.3 Increased risk of harassment that results in a change in wildlife behavior and/or direct mortality from vehicle strikes.

6.1.1.6 Off-road vehicles can be a mechanism of transference of wildlife diseases and invasive plant species if gear and apparel are not properly sanitized between sites.

6.1.5 Wildlife observation and photography (Avg. Score: 1.00)

NJ Specific Threats:
6.1.5.1 Improperly conducted recreational activities may disrupt normal wildlife behaviors which can result in reduced reproductive success or survival, abandonment of critical sites, etc.

6.1.5.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.2 Military Exercises

6.2.1 Military exercises (Avg. Score: 1.00)

NJ Specific Threats:
6.2.1.1 Military testing and training exercises may inflict disturbance and potential physical harm to wildlife.

6.2.1.3 Lack of opportunity for non-federal wildlife managers to influence activities on military bases may result in detrimental impacts to SGCN and/or missed opportunities to engage in projects that benefit SGCN.

6.3 Work and Other Activities

6.3.1 Unauthorized research projects at significant habitats (Avg. Score: 2.00)

NJ Specific Threats:
6.3.1.1 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.1.2 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.2 Authorized research projects at significant habitats (Avg. Score: 2.00)

NJ Specific Threats:
6.3.2.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.2.3 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.3 Other "work" unrelated to research (Avg. Score: 2.00)

NJ Specific Threats:
6.3.3.1 Construction projects may disrupt normal wildlife behavior which can result in reduced reproductive success or survival, abandonment of critical sites, etc. (e.g., bridge-nesting birds).

6.3.3.4 Workers may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

7 Natural Systems Modifications

7.1 Fire and Fire Suppression

7.1.1 Increase in Fire Frequency/Intensity (Avg. Score: 1.00)

NJ Specific Threats:
7.1.1.1 Increase in frequency and intensity of wild fires as a result of droughts and heat waves drying out vegetation and litter.

7.1.1.2 Increase in frequency of wild fires as a result of illegal activities.

7.1.1.3 Unnatural fire regimes occurring as a result of military exercises.

7.1.2 Suppression of Fire Frequency/Intensity (Avg. Score: 1.00)

NJ Specific Threats:
7.1.2.1 Shift in vegetative communities as a result of suppression of natural fires.

7.2 Dams and Water Management/Use

7.2.1 Abstraction of Surface Water (domestic use) (Avg. Score: 3.00)

NJ Specific Threats: 7.2.1.1 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.1.2 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.1.3 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, and eliminates shallow water habitats.

7.2.1.5 Abstraction of surface water may deplete upland mesic habitats of water needed by plants and wildlife.

7.2.2 Abstraction of Surface Water (commercial use) (Avg. Score: 3.00)

NJ Specific Threats: 7.2.2.1 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, eliminates shallow water habitats, and disrupts/removes stream bottom habitat.

7.2.2.2 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.2.3 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.2.5 Abstraction of surface water may deplete upland mesic habitats of water needed by plants and wildlife.

7.2.3 Abstraction of Surface Water (agricultural use) (Avg. Score: 3.00)

NJ Specific Threats: 7.2.3.1 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.3.2 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, and eliminates shallow water habitats.

7.2.3.5 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.3.6 Abstraction of surface water may deplete upland mesic habitats of water needed by plants and wildlife.

7.2.5 Abstraction of Ground Water (domestic use) (Avg. Score: 3.00)

NJ Specific Threats: 7.2.5.1 Heavy withdrawal of ground water for domestic use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.6 Abstraction of Ground Water (commercial use) (Avg. Score: 3.00)

NJ Specific Threats: 7.2.6.1 Heavy withdrawal of ground water for industrial and commercial use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.7 Abstraction of Ground Water (agricultural use) (Avg. Score: 3.00)

NJ Specific Threats: 7.2.7.1 Heavy withdrawal of ground water for agricultural use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.9 Small Dams (Avg. Score: 3.00)

NJ Specific Threats: 7.2.9.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.9.3 Dams act as a barrier to movement, limiting the ability of aquatic or semi-aquatic wildlife to move safely between habitats.

7.2.10 Large Dams (Avg. Score: 3.00)

NJ Specific Threats: 7.2.10.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.10.3 Dams act as a barrier to movement, limiting the ability of aquatic or semi-aquatic wildlife to move safely between habitats.

7.2.11 Dams (size unknown) (Avg. Score: 3.00)

NJ Specific Threats: 7.2.11.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.11.3 Dams act as a barrier to movement, limiting the ability of aquatic or semi-aquatic wildlife to move safely between habitats.

7.2.12 Culverts (Avg. Score: 2.00)

NJ Specific Threats: 7.2.12.1 Improper design, placement, installation and maintenance of culverts and other stream crossing structures can impede or prevent the movements of terrestrial organisms and can restrict or limit stream flow, impeding the movement of aquatic organisms along riparian corridors.

7.2.13 Stream Burial (Avg. Score: 3.00)

NJ Specific Threats: 7.2.13.1 Eliminates riparian habitats.

7.2.13.2 Eliminates in-stream habitat and water resources for wildlife.

7.2.13.3 Alters the hydrology and quality of downstream aquatic and riparian habitats.

7.3 Other Ecosystem Modifications

7.3.2 Inappropriate timing of mowing (Avg. Score: 1.00)

NJ Specific Threats: 7.3.2.1 Increased risk of direct mortality and/or reduced productivity of wildlife, as well as reduced use by migrating species.

7.3.3 Removal of coarse woody debris (streams, forests, scrub-shrub habitats) (Avg. Score: 1.00)

NJ Specific Threats: 7.3.3.1 Decreases the available detritus that normally accumulates behind and within stream obstructions, minimizing or eliminating food sources and shelters for fishes, invertebrates and amphibians.

7.3.3.2 Decreases habitat and/or corridor suitability due to limited or absent shelter and foraging habitat.

7.3.3.3 Removal of dead trees (snags), large felled logs (i.e., those > 12" dbh), and other downed woody material diminishes nesting, roosting, and sheltering options for wildlife, and increases the ease at which deer can browse regenerating vegetation.

7.3.3.4 Decreases available basking, shelter, and foraging habitats.

7.3.5 Poor habitat management (Avg. Score: 1.00)

NJ Specific Threats: 7.3.5.1 Improper or poorly scheduled maintenance of man-made corridors (e.g., roadsides and medians) can cause direct mortality to and may reduce productivity of wildlife.

7.3.5.2 Shifting from natural vegetation to lawns can cause increased temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

7.3.5.3 Vegetation clearing removes terrestrial and riparian corridors for animal movement, shelter, and resting areas.

7.3.5.4 Vegetation clearing or inappropriate alteration adjacent to aquatic habitats threatens aquatic species by degrading habitat and water quality (altering temperature and dissolved oxygen, increasing siltation and desiccation, etc.).

7.3.5.5 Habitat management that alters or removes vegetation without implementing long-term management increases the risk of invasive and exotic plants establishing themselves, outcompeting native vegetation.

7.3.5.6 Habitat management, including that which occurs on public and private lands, that does not consider timing and species' behaviors can result in the direct mortality and/or alteration or loss of habitat.

7.3.5.7 Improperly planned habitat management and/or mitigation efforts along roadsides and within the medians can attract wildlife and increase the risk of vehicle strikes.

7.3.5.9 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, eliminates shallow water habitats, and disrupts/removes stream bottom habitat.

7.3.5.10 Ditching, draining and filling of marshes and wetlands eliminates habitat and degrades the remaining surrounding areas for wildlife.

7.3.5.12 Lack of diversity in age structure and composition of vegetation due to lack of natural disturbances and/or vegetation management.

7.3.5.14 Intentional felling and removal of dead standing trees or snags eliminates resting, nesting or feeding habitat, and precludes the snags eventual contribution to coarse woody debris and forest floor structure and habitat.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species (Avg. Score: 2.00)

NJ Specific Threats:

8.1.1.1 Displace or outcompete native species for resources.

8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.

8.1.1.3 Invasive, non-native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

8.1.1.4 Invasive, non-native animals increase the risk of predation on native animals and/or herbivory on native vegetation.

8.1.1.5 Invasive, non-native animals and plants increase the risk of introduction and transference of diseases

8.1.1.6 Invasive, non-native plants may create physical barriers for some species.

8.1.2 Invasive non-native aquatic animals (Avg. Score: 1.00)

NJ Specific Threats:

8.1.2.2 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminishing habitat suitability and reducing ecological integrity of natural communities, and may introduce disease into a population.

8.1.3 Invasive non-native aquatic plants (Avg. Score: 1.00)

NJ Specific Threats:

8.1.3.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.4 Invasive non-native terrestrial/wetland animals (Avg. Score: 1.00)

NJ Specific Threats:

8.1.4.1 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.4.2 Free-roaming and feral domestic animals such as cats and dogs causes direct mortality of wildlife and disturbance to wildlife breeding and resting areas.

8.1.5 Invasive non-native terrestrial/wetland plants (Avg. Score: 1.00)

NJ Specific Threats: 8.1.5.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.6 Invasive non-native fungal/bacterial diseases (Avg. Score: 2.00)

NJ Specific Threats: 8.1.6.1 The introduction of non-native fungal and bacterial diseases threatens native populations and ecosystems.

8.2 Problematic Native Species/Diseases

8.2.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.2.1.1 Overabundant native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

8.2.1.2 Invasive pathogens and insects may increase in range and abundance as limiting factors (such as temperature) are altered as a result of climate change.

8.2.1.3 Invasive, native species can out-compete non-invasive species for resources (food, light, shelter), leading to the demise of some species populations.

8.2.1.4 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.4 Problematic Species/Diseases of Unknown Origin

8.4.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.4.1.1 Non-native or poorly understood diseases and parasites could potentially impact native animals.

8.5 Viral/Prion-induced Diseases

8.5.1 Unspecified Species (Disease) (Avg. Score: 1.00)

NJ Specific Threats: 8.5.1.1 There is a large knowledge gap regarding the existence of, or potential for, other diseases impacting native wildlife.

8.5.2 Named Species (Disease) (Avg. Score: 1.00)

NJ Specific Threats: 8.5.2.1 Diseases such as West Nile Virus, arenavirus, sudden oak death, Avian Influenza, and snake fungal disease cause morbidity or mortality to native populations.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.1 Domestic and Urban Waste Water

9.1.1 Sewage (Avg. Score: 2.00)

NJ Specific Threats: 9.1.1.1 Degradation of aquatic and marine water quality and habitats by changing turbidity, flow and water chemistry.

9.1.1.2 Leads to increased eutrophication and algae blooms that result in oxygen depletion.

9.1.1.3 Contaminants in sewage treatment effluents and Combined Sewer Overflows can cause developmental and behavioral abnormalities and reproductive failure in wildlife.

9.1.2 Run-off (Avg. Score: 1.00)

NJ Specific Threats:
9.1.2.1 Chemical fertilizers and nutrient run-off changes the pH in streams and ponds and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.1.2.2 Contaminants degrade aquatic and marine water quality and can bioaccumulate in benthic organisms, threatening wildlife by causing developmental and behavioral abnormalities and reproductive failure.

9.1.2.3 Contaminants from road runoff (oil, sediment, salt, etc.) impact native vegetation and the species that rely upon them, degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2 Industrial and Military Effluents

9.2.1 Oil Spills (Avg. Score: 1.00)

NJ Specific Threats:
9.2.1.1 Oil spills render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.1.2 Oil spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.1.3 Oil spills cause external oiling of wildlife and ingestion of oil, both of which can injure or kill wildlife.

9.2.2 Seepage from Mining (Avg. Score: 1.00)

NJ Specific Threats:
9.2.2.1 Contaminants from mining degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2.3 Other (Avg. Score: 1.00)

NJ Specific Threats:
9.2.3.1 Point and nonpoint source pollution such as polychlorinated biphenyls (PCBs), pesticides, heavy metals, and endocrine disrupting compounds (EDC's) into freshwater and marine systems pose threats to wildlife through direct contact and/or ingestion, and to aquatic species and their predators through bioaccumulation, impacting the reproductive success and neurological function of many avian and fish species.

9.2.3.2 Chemical spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.3.3 Chemical spills may render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.4 Other: Hydrofracturing (Avg. Score: 1.00)

NJ Specific Threats:
9.2.4.1 Contaminants from hydrofracturing degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2.4.2 Uncontrolled effluents escaping from hydrofracturing facilities can cause injury to wildlife and alter normal behaviors.

9.2.5 Other: Industrial toxic settling ponds (Avg. Score: 1.00)

NJ Specific Threats:
9.2.5.1 Surficial or open industrial effluent ponds can cause injury or death to wildlife that become exposed through ingestion or submersion.

9.3 Agricultural and Forestry Effluents

9.3.1 Nutrient Loads (Avg. Score: 2.00)

NJ Specific Threats:
9.3.1.1 Chemical fertilizers and nutrient run-off changes the pH in streams, ponds and wetlands and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.3.1.2 Animal waste degrades terrestrial and aquatic habitats, especially streams, ponds and wetlands, resulting in eutrophication, which disrupts oxygen and nutrient balances, and causes injury and mortality to aquatic organisms.

9.3.1.4 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades wetland and aquatic habitats with runoff, increasing sediment and nutrient loads and pH.

9.3.1.5 Conversion of native forests to plantations degrades wetland and aquatic habitats through increased runoff.

9.3.2 Soil Erosion and Sedimentation (Avg. Score: 2.00)

NJ Specific Threats: 9.3.2.1 Soil erosion, sedimentation and destruction of streambanks and riparian buffers degrade waters making them unsuitable for riparian-dependent wildlife.

9.3.2.3 Conversion of native forests to plantations degrades wetland and aquatic habitats through increased sedimentation.

9.3.3 Herbicides and Pesticides (Avg. Score: 2.00)

NJ Specific Threats: 9.3.3.1 Pesticides degrade terrestrial and aquatic habitats, especially streams, ponds and wetlands. Aquatic wildlife are particularly sensitive to these contaminants, which can cause developmental and behavioral abnormalities and reproductive failure. Some contaminants may bioaccumulate in predatory fish and birds and disrupt reproduction.

9.3.3.3 Use of pesticides can directly harm non-target species through direct contact and/or by reducing and/or contaminating their food supply.

9.3.4 Other (Avg. Score: 2.00)

NJ Specific Threats: 9.3.4.1 Spills, leaks or discharges of fuel, oil or other contaminant fluids from machinery or equipment used in the normal course of agricultural or forestry activities can degrade or destroy adjacent aquatic and terrestrial habitats and/or cause harm to non-target species (plants and animals).

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture (Avg. Score: 2.00)

NJ Specific Threats: 9.3.5.1 Use of pesticides, insecticides, and/or herbicides can directly harm non-target species, such as amphibians and beneficial invertebrates through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5.4 Improper use of current insecticides, such as those containing esfenvalerate, prallethrin, or piperonyl butoxide, or past use of pesticides containing chlordane still present in the soils, are toxic to various wildlife species, and can cause injury, mortality, or other effects that impair population viability.

9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.4 Garbage and Solid Waste

9.4.1 Direct hazards to wildlife (Avg. Score: 1.00)

NJ Specific Threats: 9.4.1.2 Garbage and solid waste destroys natural habitats and obstructs wildlife movements.

9.5 Air-Bourne Pollutants

9.5.1 Acid Rain (Avg. Score: 2.00)

NJ Specific Threats: 9.5.1.1 Causes acidification of water bodies, resulting in changes to aquatic and marine communities and reducing biodiversity, and creating conditions that are unsuitable for some aquatic (freshwater and marine) and semi-aquatic species that are sensitive to pH shifts.

9.5.1.2 Leaches calcium from the soils which in turn reduces the availability of prey, particularly calcium-rich prey such as snails.

9.5.4 Other (Avg. Score: 1.00)

NJ Specific Threats: 9.5.4.1 Dust and/or airborne sedimentation from construction sites, agricultural operations or related earth disturbances can introduce mineral or organic sediments into adjacent wildlife habitats, degrading their quality and suitability for wildlife short-term and/or long-term.

9.5.6 Herbicides and Pesticides (Avg. Score: 2.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

9.6 Excess Energy

9.6.2 Thermal Pollution (Avg. Score: 1.00)

NJ Specific Threats: 9.6.2.2 Water temperature changes to aquatic systems can deter or preclude use by SGCN (e.g., alter habitat suitability for wildlife species, reduce prey base) or present stressors that are harmful if not fatal to wildlife.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 1.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.2 Droughts

11.2.1 Droughts (Avg. Score: 2.00)

NJ Specific Threats: 11.2.1.1 Contribute to hardened soils, decreasing water recharge during rains and increasing the likelihood of flash floods during storms.

11.2.1.2 Lead to lower groundwater levels and therefore, less available water for people and habitats.

11.2.1.3 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

11.2.1.6 Increased desiccation risk for amphibians and altered wetland hydrology for critical habitats including breeding pools.

11.3 Temperature Extremes

11.3.1 Temperature extremes (Avg. Score: 2.00)

NJ Specific Threats: 11.3.1.1 Increasing temperatures may cause habitat loss and degradation by desiccating and/or raising the temperatures of small wetlands and streams leading to the loss of freshwater mussels and other aquatic species and species reliant upon these habitats.

11.3.1.2 Increased temperatures can negatively impact wetland, riverine, lacustrine and vernal pool-associated or -dependent wildlife by reducing flows, increasing water temperatures, lowering water levels and causing premature drying of vernal habitats.

11.3.1.4 Extremely low temperatures and/or extensive periods of unseasonably low temperatures during critical life history stages (e.g., hibernation, gestation/nesting) can alter animals' behaviors and decrease survivorship.

11.4 Storms and Flooding

11.4.1 Storms and flooding (Avg. Score: 1.00)

NJ Specific Threats: 11.4.1.1 Extreme storms and flooding events threaten aquatic and marine wildlife through habitat degradation and alteration, including alterations to off-shore or back-bay benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic and marine wildlife.

11.4.1.4 Flood events alter river or stream morphology, benthic conditions and habitat availability for wildlife, cause bank erosion, and deposit sediments in floodplain wetlands altering wildlife habitat.

11.4.2 Increased rainfall (Avg. Score: 1.00)

NJ Specific Threats: 11.4.2.1 Extreme rain events threaten aquatic wildlife through habitat degradation and alteration, including alterations to benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic wildlife.

11.4.2.2 Extreme rain events can damage wildlife nesting and resting habitats, including impacts to avian eggs and chick and small mammal survivorship.

11.4.2.3 More frequent rain events can alter terrestrial and wetland vegetation communities as well as wetland hydrology, shifting wildlife community use.

11.6 Phenology Shifting or Alteration

11.6.2 Phenology shifts related to predator-prey ecology (Avg. Score: 1.00)

NJ Specific Threats: 11.6.2.1 Alters inter-specific relationships (e.g., competition, parasitism, predation) of wildlife, ultimately leads to detrimental impacts on the ecological system.

11.6.2.2 Shifts timing of species migration, breeding and hibernation, and available food resources, causes redistribution of species, or mortality for species that are unable to relocate due to their already isolated habitat or limited mobility.

11.6.3 Phenology shifts related to species redistribution (Avg. Score: 1.00)

NJ Specific Threats: 11.6.3.1 Shifts in timing of species migration, breeding and hibernation, and available food resources, as a result of wildlife range shifts driven by climate change.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 2.00)

NJ Specific Threats: 12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.2 Lack of up-to-date existing information (Avg. Score: 2.00)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.3 Need to answer research question (Avg. Score: 2.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.4 Need to develop new technique (Avg. Score: 2.00)

NJ Specific Threats: 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 1.00)

NJ Specific Threats: 12.3.0.6 Certain geographic or habitat features, such as vernal pools and headwater wetlands or streams, may be too small, mischaracterized, or misidentified to benefit from regulatory protection.

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 1.00)

NJ Specific Threats:
- 12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.
- 12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.
- 12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 2.00)

NJ Specific Threats:
- 14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.
- 14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.
- 14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 2.00)

NJ Specific Threats:
- 14.2.1.1 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various forest management practices.
- 14.2.1.2 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various aquatic and riparian management practices.
- 14.2.1.5 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various wetland management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 1.00)

NJ Specific Threats:
- 15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

- 1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.4 Secure and promote the protection, restoration, and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts through incentive programs.

1.2.1.5 Secure and promote the protection/restoration of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through incentive programs.

1.2.1.6 Secure and promote the protection/restoration of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers through incentive programs.

1.2.1.7 Secure and promote the protection/restoration of fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.12 Create incentives (non-monetary and/or monetary) for land developers to redevelop abandoned areas (e.g., shopping centers, office complexes) to minimize the loss of natural habitats and reduce the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.14 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of herbicides and pesticides, and implementing more ecologically safe strategies when using such products.

1.2.1.18 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and land managers to control and reduce the impacts of invasive, native and non-native species in order to increase structural habitat diversity.

1.2.1.20 Coordinate across government agencies and non-government organizations to create or expand upon tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMP's.

1.2.1.23 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to provide cost shares and/or plan approvals for management based on management approaches and prescriptions.

1.2.1.25 Create incentives (non-monetary and/or monetary) within State regulations to assist and programs to deliver those incentives to aquaculture growers to relocate, for example, from intertidal to subtidal lease areas through buyouts of leases or microloans, and/or promoting on-lease conservation measures used by aquaculture growers (such as the implementation of conservation easements, use of living shorelines, incorporation of BMPs for habitat protection, etc.) for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

2 Direct Management of Natural Resources

2.2 Dam and barrier removal

2.2.1 Culvert work

2.2.1.1 Replace existing barriers to wildlife movement with and/or install appropriately-sized systems to accommodate wildlife dispersal.

2.3 Fire management

2.3.3 Prescribed burning

2.3.3.1 Evaluate different management techniques of prescribed burns that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

2.3.3.2 Conduct prescribed burning in Northern New Jersey forests to maintain and regenerate a mosaic of upland forest habitats.

2.3.3.3 Conduct prescribed burning to improve wildlife habitat.

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.5 Implement biologically safe and appropriate control/management strategies, and where appropriate, eradication strategies to reduce the impacts and/or limit the distribution of invasive and/or non-native plant species within or near aquatic systems using methods that will provide the most protection to the aquatic and riparian ecological system, and minimize disturbance to the soil and wildlife. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.8.0.6 Implement long-term management of invasive and/or non-native plants to help maintain functioning ecological systems and biological diversity, and to enhance travel corridors. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.4 Restore and/or enhance suitable travel corridors connecting conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.8 Protect significant natural and/or unique communities by implementing best management practices when conducting habitat restoration strategies.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.12 Create and/or maintain scrub-shrub habitats through revegetation efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.15 Restore and/or enhance terrestrial and aquatic habitats proximate to but not adjacent to roads and other transportation corridors for terrestrial-bound SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.10.0.18 Implement a habitat improvement and restoration program to restore cold-water fish habitat, ecosystems and populations.

2.10.0.20 Expand breeding opportunities for obligate vernal pool breeders and related herpetofauna by creating vegetated buffers for dispersal from breeding pools in all directions, or as needed to establish the connectivity of metapopulations.

2.10.0.21 Restore and/or enhance understory habitats that suppress invasive species and provide critical resources and enhance sheltering, foraging, and nesting cover for wildlife.

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.10.0.24 Use NJ's CHANJ mapping and guidance to establish vegetation and enhance or create corridors between fragmented habitats with similar vegetation, slope, soils, structure, etc. to ensure vegetative integrity is maintained to allow wildlife to safely disperse, and corridors are buffered with natural habitats to minimize disturbance to wildlife within the corridors.

2.10.0.25 Enhance SGCN fish habitats through aquatic and riparian vegetation restoration.

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.11.0.3 Create suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats through vegetation management.

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through vegetation management.

2.11.0.6 Reclaim degraded rare species habitats by conducting vegetation management needed to restore habitat value for the documented/target SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.8 Maintain, enhance and/or restore biologically appropriate buffers for SGCN-inhabited/used freshwater wetlands through vegetation management.

2.11.0.13 Implement best management practices (BMPs), protective strategies, and guidelines for vegetation management to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.11.0.14 Conduct vegetation management adjacent to roads for SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.11.0.16 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.11.0.18 Implement forest management/silvicultural strategies that promote the development of new old-growth forests and/or minimize the loss of old-growth forest stands with large trees and within large, contiguous tracts.

2.11.0.20 Create and/or maintain scrub-shrub habitats through management efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.11.0.21 Minimize the degradation, alteration and/or changes in hydrology of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and subsequent disturbances to and behavioral changes of wildlife by maintaining or enhancing these areas and biologically appropriate buffers through habitat management and/or revegetation or restoration efforts.

2.11.0.23 Implement appropriate habitat management actions in areas where natural disturbances, such as wildfire, have been precluded.

2.11.0.24 Conduct vegetation management adjacent to aquatic habitats following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.25 Conduct vegetation management along access roads following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.26 Conduct vegetation management along roadsides and medians, avoiding peak activity periods for wildlife, that enhances wildlife dispersal naturally and safely across roads and similar barriers to/between terrestrial and/or aquatic habitats.

2.11.0.27 Conduct vegetation management for target shrub- or young forest-dependent SGCN following BMPs to minimize the risk of the establishment of invasive and non-native plants.

2.11.0.28 Conduct vegetation management in agricultural areas following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.29 Conduct vegetation management on transportation and service corridors (i.e., rights-of-way) following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.31 In areas where vegetative communities are shifting due to fire suppression and controlled burns are not feasible, manage vegetation to improve wildlife habitat.

2.11.0.32 Increase structural habitat diversity around and when feasible, within agricultural landscapes by managing vegetation for a variety of species, in particular, those farms that have removed scrub-shrub habitat and/or fragmented forests, and by implementing ecologically best practices (e.g., no-till farming, maintaining hedgerows, buffer set-asides, etc.).

2.11.0.33 Increase structural habitat diversity by implementing long-term vegetation management to minimize the potential for the establishment of invasive and/or non-native plants that may outcompete native vegetation.

2.11.0.34 Increase structural habitat diversity by managing residential, commercial and recreational areas' landscapes for a variety of species. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.35 Increase structural habitat diversity by managing vegetation adjacent to aquatic habitats in a manner that provides a buffer from runoff and erosion and a microclimate to stabilize seasonal temperatures to benefit a variety of aquatic and semi-aquatic species.

2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.

2.11.0.37 Increase structural habitat diversity by minimizing the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats which benefits wildlife.

2.11.0.38 Increase structural habitat diversity in and around horse/livestock farms by managing vegetation for a variety of species, in particular, in and around farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

2.11.0.39 Increase structural habitat diversity in and around solar farms by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.40 Increase structural habitat diversity surrounding areas used for energy, mining, and transportation and service corridors by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides, and avoid managing habitat during the breeding seasons for ground-nesting birds, reptiles, amphibians and small mammals.

2.11.0.41 Increase structural habitat diversity through the implementation of a variety of vegetation management practices such a prescribed burns (either increasing or decreasing their frequency depending on the site and objective), plantings, etc. that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.42 Increase structural habitat diversity within wind farms for terrestrial bound and low-flying species and around wind farms for other wildlife by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.43 Manage forests to increase variation in age structure and composition using BMPs that promote and maintain functioning ecological forest-based systems and biological diversity.

2.11.0.45 Regularly and/or rotationally create young forest habitat in targeted areas to maintain and regenerate a mosaic of upland forest habitats that will benefit shrub- and young forest-dependent species.

2.13 Wildlife damage management

2.13.0 Nuisance fish and wildlife damage

2.13.0.1 Investigate the impacts of mosquito control methods on predator SGCN (bats, insectivorous birds). Develop, implement and evaluate the effectiveness of mosquito control-BMPs designed to avoid depletion or contamination of SGCN's insect prey base and drinking sources with pyrethroids, organophosphates, or other chemicals.

2.13.0.2 Develop, implement and evaluate the effectiveness of BMPs for mosquito control methods that may produce benefits for coastal marsh dependent SGCN wildlife, including but not limited to high-marsh nesting birds and migrating shorebirds and landbirds.

2.13.0.4 Investigate the effects of mosquito control methods on freshwater aquatic and semi-aquatic SGCN including but not limited to, amphibian, fish, dragonfly, and damselfly populations.

2.13.0.5 Investigate the impacts of human-subsidized and/or naturally occurring predator species on SGCN to assess the need for integrated wildlife damage management techniques (e.g., predator exclosures, fish blockages, electric fence, culls) and/or policy changes on state land management that minimize the impacts of human-subsidized predators.

2.13.0.6 Develop, implement and evaluate the effectiveness of predator-control techniques aimed at improving SGCN populations and methods to minimize the impact of those species carrying parasites or diseases that may impact SGCN (e.g., raccoon roundworm kills Allegheny woodrat).

2.13.0.8 Implement and assess management strategies to control and reduce the impacts of detrimental species and diseases that pose threats to native wildlife or communities.

2.14 Wildlife disease management

2.14.0 Wildlife disease strategy development and investigation

2.14.0.1 Investigate diseases/pathogens impacting SGCN and/or their habitats.

2.14.0.2 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

2.14.0.3 Protect SGCN from exotic pathogen introduction or incident through implementation of a "rapid response plan"; DFW to give priority attention to these species in planning and/or implementing a response.

2.14.0.4 Conduct long-term monitoring of diseases in vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts.

2.14.0.5 Assess the impacts of diseases on the life cycles of wildlife.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.6 Conduct long-term studies on resident and migratory SGCN to determine if there are changes to the populations' demography (productivity, survival, dispersal) and/or to their critical and/or supporting habitats (i.e., diminishing in value, acreage or connectivity, etc.), in particular changes that would not maintain SGCN at viable levels for species populations. Update data and GIS maps; provide updated information to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.9 Identify SGCN (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources, and compile/collect and evaluate data/information regarding potential management strategies to improve the availability of such SGCN's food resources.

3.0.0.10 Conduct long-term studies to evaluate the effectiveness of management strategies implemented to enhance food/prey availability for SGCN [whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources] through studies that investigate the populations and health of the food resources as well as the target SGCN. Revise management strategies as needed and continue to monitor the effectiveness of the efforts.

3.0.0.11 Develop, implement and evaluate the effectiveness of town plans that avoid impacts to SGCN species and their habitats.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.14 Identify areas with invasive, aquatic plants and animals and collect a detailed baseline assessment of the species' status and distribution. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort. Researchers and contractors performing Forest Stewardship Inventories and/or Plans on state lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.0.0.19 Identify the presence and status (e.g., functioning, structure, slated for removal, etc.) of existing dams and culverts within and/or that may impact SGCN and their habitats, and create a database that includes a GIS component identifying the locations of such structures and their status. Share this information with appropriate organizations and/or agencies evaluating the benefits and risks of such structures on SGCN and their habitats.

3.0.0.20 Once baseline data identifying and describing the status of existing dams and culverts have been gathered, conduct evaluations at a variety of sites to determine whether the benefits of culvert and dam creation or removal outweigh the risks to SGCN species and their habitats, and if other variables/conditions specific to individual sites/locations result in a different outcome. Identify and target appropriate dams and culverts for removal and/or reconstruction to minimize harm to SGCN species and their habitats.

3.0.0.22 Develop, implement and evaluate the success of a habitat improvement and restoration program to restore cold-water fish habitat, ecosystems and populations.

3.0.0.23 Identify (through wildlife and aquatic system surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and research water quality parameters for all [types of] aquatic systems for various SGCN populations.

3.0.0.24 Identify (through aerial and topographic maps), and confirm through field surveys, potential vernal pools using standard protocols. Provide confirmed vernal pool locations (and when possible, a description of the pools condition) and species' presence data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.26 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species including objectives and guidance pertaining to and the condition/status of critical and supporting habitats.

3.0.0.27 Evaluate the effectiveness of strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals through research and monitoring. Develop and provide NJ DEP and other appropriate governing agencies/commissions a summary of findings and recommendations to improve such efforts.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.2 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.0.3 Survey for and monitor populations of freshwater aquatic focal SGCN to assess the populations' demography, trends, condition, distribution, etc.

3.2.0.4 Conduct long-term monitoring of the impacts of contaminants to vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.2.0.5 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

3.2.0.6 Develop, implement and conduct studies to evaluate the effectiveness of methods implemented to reduce road mortality of wildlife (e.g. wildlife underpasses, road closures).

3.2.0.7 Track (via a database that includes a GIS component) and research problematic species and diseases to determine their distribution, impacts on SGCN wildlife/wildlife communities, and develop potential control measures.

3.2.0.8 Implement and conduct long-term monitoring of control measures aimed at minimizing the impacts of problematic species and/or diseases to evaluate the effectiveness of such efforts and to identify and incorporate additional strategies as appropriate.

3.2.0.10 Evaluate the effectiveness of sanitation/decontamination protocols in minimizing the transference of wildlife diseases and invasive plant species.

3.2.0.11 Investigate the impacts of ORV use as a mechanism to spread wildlife diseases and invasive plant species to native wildlife and habitats. Integrate this information when mapping undeveloped roads and trails to identify potentially sensitive areas in northern NJ forests.

3.2.0.21 Investigate the effects of mosquito control methods on freshwater aquatic and semi-aquatic SGCN including but not limited to, amphibian, fish, dragonfly, and damselfly populations.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.2 Age, size and sex structure

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.3 Baseline inventory

3.2.3.7 Identify roads or portions of roads, paved or unimproved (through site surveys, land use/land cover assessments and analyses, review of available data, enlistment of species experts, etc.) with high incidences of road mortality and/or presence of snakes, turtles, medium-sized and large mammals. Conduct assessments of the roads and incorporate information into a database that includes descriptions (e.g., qualifiers to help prioritize the roads' risk to wildlife) and a GIS component of the locations of such areas. Share this information with appropriate organizations and/or agencies working to implement measures (e.g., wildlife passages, road closures) to minimize the risk to these species.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.6 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) that could, through revegetation and/or enhancement efforts, become suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN.

3.3.1.7 Map and prioritize existing and potential areas for early succession forest management. Share the results with state, county and municipal planners.

3.3.1.8 Assess the availability and suitability of forest habitats for SGCN species (particularly reptiles and amphibians, birds, pollinators, and tiger beetles) in southern forests since Superstorm Sandy.

3.3.1.17 Identify and map undeveloped roads and trails in all conserved forests, and create a database of locations. Integrate information regarding potentially sensitive areas.

3.3.1.18 Conduct an assessment using available data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels.

3.3.1.19 Identify and codify legal ORV access areas on state (and if appropriate, other conserved) lands. Provide GIS mapping to the landowner for potential use in directing such recreational activities.

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.2 Monitoring

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.4 Protect water quality and aquatic-dependent species by appropriately designating Category 1 waters and enforcing protective regulations. Seek appropriate classifications for stream segments based on Endangered and Threatened Status and/or the Index of Biotic Integrity (IBI) results that do not fulfill Category One requirements.

3.3.2.5 Conduct long-term monitoring of water quality of SGCN aquatic habitats (and aquatic systems feeding into those habitats) to evaluate protection and management efforts to reduce, if not eliminate, chemical contamination, siltation, eutrophication, and other forms of pollution/contamination of aquatic systems.

3.3.2.9 Investigate the effectiveness of various silviculture techniques for enhancing forests for forest-dependent SGCN.

3.3.2.10 Evaluate the efficacy and success of different management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.3.2.13 Evaluate the effectiveness of management strategies (e.g., timing restrictions for mowing, cooperative agreements with utility companies for maintenance of rights-of-ways) that maintain and enhance large existing areas of grassland in perpetuity. Focus on habitat patches that can be managed to enhance the total size of suitable grassland habitat and create interspersed early-successional habitat.

3.3.2.14 Research and evaluate the effectiveness of water quality management practices on water-dependent and semi-dependent SGCN, particularly those practices associated with permitting or mitigation actions.

3.3.2.15 Investigate the effectiveness of management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.3 Develop/improve management techniques that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.8 Develop best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.14 Develop aquaculture practices in the coastal areas that are compatible with the recovery of SGCN.

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.3.16 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.3.20 Develop guidance on various silviculture techniques for enhancing forests for forest-dependent SGCN.

3.5.3.21 Develop management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.22 Identify (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) and modify management strategies (e.g., timing restrictions for mowing, cooperative agreements with utility companies for maintenance of rights-of-ways), based on research, that maintain and enhance large existing areas of grassland in perpetuity.

3.5.3.23 Revise water quality management practices based on research on water-dependent and semi-dependent SGCN, particularly when associated with permitting or mitigation actions.

3.5.3.24 Based on research, modify management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.1 Develop studies to evaluate management strategies to improve the availability of prey/food resources for SGCN whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources. Monitor and investigate the management strategies over time to determine success and/or the need to revise methods.

3.5.4.2 Develop, implement, monitor and evaluate management strategies to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

3.5.4.4 Investigate the effects of mosquito control methods on freshwater aquatic and semi-aquatic SGCN including but not limited to, amphibian, fish, dragonfly, and damselfly populations.

3.5.4.5 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

3.5.4.9 Conduct studies to evaluate the impacts of roads on SGCN and develop, implement and conduct studies to evaluate the effectiveness of methods to reduce road mortality of wildlife (e.g. wildlife underpasses, road closures).

3.5.4.13 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.17 Investigate new, non-invasive techniques for SGCN population evaluation through literature review, expert opinion, trial studies (if low risk), etc.

3.5.4.18 Investigate the effectiveness of survey techniques through selected “ground truthing” and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

3.5.4.21 Develop BMPs to address problematic species and diseases of unknown origin.

3.5.4.22 Investigate the efficacy of implementing strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities.

5 Facilities and Areas

5.15 Wildlife Management Areas

5.15.6 Roads

5.15.6.1 Clearly post areas/roads where vehicle access is permitted.

5.15.6.2 Clearly post areas/trails where vehicle access is not permitted.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.3 Secure and protect riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.4 Secure and protect fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.6 Secure and protect old-growth forest stands with large trees and/or stands that are approaching or being actively managed for old growth forests, in particular those within large, contiguous forest tracts, through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.7 Secure and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.8 Secure and protect scrub-shrub habitats for SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.3 Increase the protection of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through conservation area designations.

6.3.0.6 Promote the protection of old-growth forest stands with large trees and/or stands that are approaching or being actively managed for old growth forests, in particular those within large, contiguous forest tracts, through conservation area designations.

6.3.0.7 Promote the protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through conservation area designations.

6.3.0.8 Promote the protection of scrub-shrub habitats for SGCN through conservation area designations.

6.4 Private lands agreements

6.4.0 Private land agreement strategies

6.4.0.1 Enter into private lands agreements to expand control burns on private lands, in particular those adjacent to conserved lands to improve SGCN habitats.

7 Law Enforcement

7.1 Law enforcement

7.1.3 Sub-national Level

7.1.3.2 Increase the number of law enforcement officers tending to wildlife issues to a reasonable number to sufficiently cover the State and marine waters.

7.1.4 Scale Unspecified

7.1.4.1 Improve enforcement of policies and/or regulations that promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

7.1.4.3 Increase law enforcement presence proximate to sensitive areas [e.g., avian nesting sites, in particular rookeries, and reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively)] to deter human activity and subsequent disturbance to SGCN.

7.1.4.6 Recruit law enforcement to assist in the protection and enhancement of SGCN populations, in particular endangered species, through improved awareness of species through trainings, partnerships, and other methods. Information should include but is not limited to: 1) Issues concerning illegal collection of reptiles, 2) Persecution of rare snakes, 3) Illegal recreational activities on public lands (e.g., off-road vehicles) and their impact on wildlife, 4) Identification of sensitive areas, critical sites and/or "hot-spots" for collection.

7.1.4.7 Increase law enforcement presence to enforce regulations governing recreational activities (e.g., the use of personal watercraft and off road vehicles, caving, rock climbing, etc.) on conserved lands and within other sensitive habitats, and discourage activities that cause harm or disturbance to vegetation, wetlands, fish and wildlife.

7.1.4.9 Implement policies that improve and secure habitat connections between conserved SGCN habitats.

7.1.4.10 Implement policies that promotes expanding acreages and enhances the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.13 Implement policies that protect vernal pool habitats to benefit SGCN that rely upon them and promotes connectivity of SGCN populations.

7.1.4.14 Implement policies that protect existing and developing old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

7.1.4.15 Implement policies that preserve and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

7.1.4.16 Implement policies that protect and restore riparian areas.

7.1.4.17 Improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

7.1.4.19 Implement policies that protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

7.1.4.23 Implement policies that minimize wildlife road mortality.

7.1.4.26 Educate law enforcement personnel that there may be unauthorized research projects taking place and to encourage them to investigate any activities that appear to be harmful to wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.1.0.4 Engage government agencies, conservation partners and other stakeholders in constructive dialogues encouraging them to influence policy change and the creation of incentives through a habitat bill and/or municipal ordinances for backyard habitat.

8.1.0.6 Engage government agencies, conservation partners and other stakeholders in discussions focused on sharing information regarding coastal and marine critical wildlife habitats, developing comprehensive mapping to assist in reducing impacts of energy production activities, and establishing a long-term monitoring program to update the data. Ensure this information is available to appropriate personnel for planning or response measures.

8.1.0.11 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting sportsmen's organizations and fisheries, as well as public constituents, addressing the unintended effects abandoned fishing gear, tackle and crab pots can have on wildlife, and promote the collection and/or reporting of abandoned items and their locations.

8.1.0.12 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting sportsmen's organizations and fisheries, as well as public constituents, addressing the unintended effects fishing gear and tackle can have on wildlife.

8.1.0.13 Engage DOD in a constructive dialogue regarding strategies to minimize disturbances to all SGCN (i.e., beyond their federal requirements) from forest management and other practices on their lands.

8.1.0.14 Engage DOD in a constructive dialogue regarding strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities.

8.1.0.15 Engage government agencies, conservation partners and other stakeholders in discussions encouraging and supporting the creation of laws and policies requiring vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

8.1.0.16 Engage local governments in discussions regarding the importance of them adopting/passing ordinances which require assessing and addressing secondary impacts (i.e., ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

8.1.0.17 Engage municipalities in constructive dialogue to identify and minimize destruction of areas prioritized for early succession forest management.

8.1.0.18 Engage NJDOT, NJ Transit Authority and other road management entities, wildlife conservation organizations/agencies (e.g., Division of Fish and Wildlife, New Jersey Conservation Foundation, Conserve Wildlife Foundation of NJ), and communities and citizens in discussions regarding the importance of and methods to enhance habitat connectivity, and work together to develop feasible strategies for ensuring that wildlife can disperse naturally and safely across roads and similar barriers to terrestrial and/or aquatic habitats.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.21 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation human-subsidized and/or overabundant, native species cause to local nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.22 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation invasive species cause to native nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.26 Coordinate across federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to woodland landowners to adopt or endorse consistent best management practices concerning controlled burns to maintain and/or improve forested habitat for wildlife.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.32 Work with NJ DEP's Water Management, other state agencies and watershed organizations to determine if mitigation is warranted at applicable power plants.

8.1.0.33 Engage government agencies, conservation partners and other land managers, communities, landowners, and commercial and industrial stakeholders in discussions regarding the importance of protecting and methods to protect priority wetlands beyond the levels afforded through regulation by maintaining and/or restoring optimal biological buffers around wetlands.

8.1.0.34 Work with the NJ Education Association and Department of Education to design curriculum and outdoor experimental learning opportunities, and provide training to teachers on implementation of these activities.

8.1.0.37 Enlist landowners and NJ citizens in the protection of and survey efforts for SGCN, in particular rare species, by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management and wildlife-related volunteer programs.

8.1.0.38 Engage partners, stakeholders and land managers in constructive dialogue promoting forest stewardship for SGCN that use core forests and forested corridors.

8.1.0.40 Encourage researchers, land managers, naturalists and enthusiasts to follow proper procedures for the coordination and/or permitting of research/management activities involving wildlife and sensitive habitats, and discourage activities that alter vegetation or wetlands, or cause harm or disturbance to wildlife.

8.1.0.42 Engage citizens, wildlife observers and photographers through discussions and distributable information regarding the importance of and encouraging implementing responsible and ethical behavior when observing wildlife by developing an alliance of wildlife photographers and widely circulating recommendations on how to reduce impact.

8.1.0.44 Engage conservation partners, stakeholders, government agencies and other land stewards in constructive dialogues encouraging their inclusion of controlled burns in forest and other stewardship plans.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.7 Develop and provide (or otherwise make publicly available) educational programs and/or materials that describe the negative impacts of off-road vehicles and watercraft use in and adjacent to critical SGCN habitats, and the importance of confining such activities to more appropriate locations and/or seasons.

8.3.0.8 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate recreationists and encourage landowners to eliminate garbage in the vicinity of suitable wildlife habitat, in particular SGCN habitat. Information should include the detrimental impacts garbage may have on various wildlife species.

8.3.0.9 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners and land managers to include only native plants in landscaping and restoration projects. Provide information to assist them in detecting problematic establishment of invasive, non-indigenous plants.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.15 Develop an educational outreach program for citizens regarding: 1) The impacts to wildlife as a result of plastic bags entering aquatic and marine systems, 2) The importance of decreasing the amount of plastic shopping bags in circulation, 3) The need for businesses to voluntarily charge for bags or reimburse people for using their own non-plastic bags, and 4) The need for their assistance through public pressure on legislators and government to pass legislation that that limits the amount of plastic shopping bags in circulation.

8.3.0.19 Develop an educational outreach program for the public on the devastating effects predators can have on native nesting wildlife.

8.3.0.24 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

8.3.0.25 Develop educational outreach programs for landowners, nurseries and the general public regarding the negative impacts of invasive and non-native plants on our natural communities.

8.3.0.26 Develop educational outreach programs for private and public landowners and land managers regarding the importance of and how to manage core forests and forested corridors in a way that will be beneficial for SGCN, particularly endangered, threatened and special concern species.

8.3.0.27 Develop educational outreach programs for public and private landowners and land managers regarding the importance of structural habitat diversity, methods to increase diversity, and/or incentive programs available to increase habitat diversity.

8.3.0.29 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about the importance of maintaining a vegetative buffer along riparian and aquatic habitats to intercept storm water runoff and minimize soil erosion.

8.3.0.30 Develop educational outreach programs for private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.5 Develop a plan that directs the creation or expansion of energy or utility rights-of-way in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.6 Develop a plan that directs the creation or expansion of roads and railroads or the re-establishment of abandoned railroads within and adjacent to critical forested habitats in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.7 Develop a plan that directs the maintenance of or new channelization of forested streams and rivers in a manner that minimizes impacts of the aquatic ecological system and adjacent forest

9.1.0.8 Develop a plan that focuses on strategies for oil pipelines to avoid sensitive habitats that would be highly impacted by oil spills.

9.1.0.9 Develop a plan that focuses on strategies to minimize the creation of renewable energy farms (e.g., solar, wind) and related infrastructures within and their impacts on forested habitats and the wildlife community.

9.1.0.10 Develop a plan that focuses on strategies to minimize the impacts of mining on critical forested habitats.

9.1.0.11 Develop a plan that focuses on strategies to minimize the impacts of power plants on critical forested habitats and the wildlife community.

9.1.0.13 Develop a plan to minimize agriculture that would result in groundwater withdrawal in critical forested areas.

9.1.0.14 Develop a plan to minimize development that would result in groundwater withdrawal in critical forested areas.

9.1.0.15 Develop a plan to minimize fragmentation of terrestrial and aquatic habitats by roads.

9.1.0.16 Develop a plan to minimize new lawnscapes and preserve natural vegetation within and adjacent to critical forest areas.

9.1.0.17 Develop a plan to minimize nutrient and effluent loads from aquaculture practices.

9.1.0.18 Develop a plan to minimize the effects of road widening and traffic volume increases within critical wildlife habitat areas using CHANJ products.

9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

9.1.0.20 Develop a plan to minimize the impacts of existing agricultural properties adjacent to and the conversion of forest habitats (terrestrial and aquatic, within or adjacent to critical forests) to agriculture, grazing areas/livestock farms, and plantations.

9.1.0.21 Develop a plan to minimize the use of any-sized dam in critical forested areas.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.23 Develop a plan to mitigate the effects of transportation barriers by using CHANJ products.

9.1.0.24 Develop a plan to prevent livestock from entering water bodies in critical forested habitats.

9.1.0.25 Develop a plan to prevent the conversion of forested stream buffers to pastures in critical forested habitats.

9.1.0.27 Develop a plan to use wildlife-appropriate culverts in critical forested areas.

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.31 Develop wetland restoration plans that consider the life history and needs of wildlife occupying targeted habitats.

9.1.0.32 Incorporate aquatic habitat connectivity and water quality/effluent standards into local and state aquaculture plans and BMPs.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.2 Organizational strategic and CMS planning

9.2.1 Organizational strategic and operational planning

9.2.1.1 Identify and codify legal ORV access areas on state lands.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.5 Develop response plans to address disease outbreaks within wildlife populations, in particular SGCN.

9.3.1.7 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.10 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.14 Create species management plans that will promote the protection and where appropriate, the development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

9.3.1.16 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.2 Listed species recovery planning

9.3.2.1 Develop proactive species recovery plans for all endangered and threatened species including guidance and objectives pertaining to critical and supporting habitat to meet and maintain recovery goals.

9.3.3 Habitat management planning

9.3.3.6 Develop a management plan for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

9.3.3.7 Develop a management plan to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

9.3.3.8 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.3.9 Develop a response plan to outbreaks using BMPs to control infestations and limit their spread in a way that avoids excessive harm to non-target species.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.16 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.21 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.3.22 Create management plans to minimize and/or prevent wildlife road mortality that will incorporate wildlife passages in conjunction with barrier fencing and, where possible, seasonal closures. Aquatic-associated passages must avoid disturbance to the natural streambeds and riparian habitat, permit high volumes of water to flow freely, and provide adequate travel corridors for terrestrial wildlife, while maintaining stream flow for fish passage. Bridges that span rivers and streambeds and include floodplain habitat on either side of the span to provide travel corridors for terrestrial wildlife are preferred over culverts.

9.3.3.23 Create forest management plans that will promote the protection and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

9.3.3.24 Develop a plan to improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

9.3.3.27 Develop a management plan to expand breeding habitat and connectivity for tiger salamanders and other obligate vernal pool breeders.

9.3.3.29 Develop habitat management plans aimed at reducing or eliminating negative impacts of ORVs.

9.3.3.32 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3.34 Include controlled burn prescriptions in forest and stewardship plans to improve wildlife habitat.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.3 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.9 Review strategies for creating or enhancing connectivity (e.g., installing appropriately-sized wildlife passages) between wetlands to allow wildlife to disperse naturally and safely.

11.1.1.10 Use CHANJ mapping in reviews of proposed energy, mining, transportation and utility service companies/agencies' projects to attempt to maintain habitat connectivity and reduce fragmentation, and identify potential impacts of the projects.

11.1.1.11 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed offshore energy projects relating to drilling, extraction and distribution of petroleum and gas products to reduce habitat destruction and minimize impacts on wildlife.

11.1.1.12 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed solar farm projects to reduce habitat fragmentation and minimize impacts on wildlife.

11.1.1.13 Use the best available science (species data, habitat present, wind farm layout options, wind blade impacts on migratory species, location of migration routes, etc.) when conducting regulatory reviews of proposed wind farm projects to minimize impacts on migratory and resident wildlife and reduce habitat fragmentation.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.2.2 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.2.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into the environmental review process to help establish policies and plans that minimize the impact of aquaculture on fish and wildlife.

11.1.2.4 Review strategies for creating or enhancing connectivity (e.g., installing appropriately-sized wildlife passages) between wetlands to allow wildlife to disperse naturally and safely.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.2 Provide technical support to public and private landowners and land managers for controlling invasive, native and non-native plant species in order to increase structural habitat diversity.

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.7 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on the importance of maintaining habitat connectivity, minimizing fragmentation, and the use of CHANJ products to help them target areas for such planning.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.11 Provide educational resources, training programs, and on-the-ground guidance to private and public landowners and land managers on the benefits of and for creating young forest and early succession habitat for SGCN.

11.2.0.12 Provide educational resources and technical support to public landowners and land managers for managing grasslands for grassland-dependent species.

11.2.0.13 Provide educational resources and technical support to public landowners, private landowners with sufficient acreage, and land managers to promote the protection and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

11.2.0.14 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters), and to enhance or restore biologically appropriate buffers.

11.2.0.15 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and landowners about the importance of retaining and in an effort to protect, create, enhance and/or restore vegetation along aquatic habitats.

11.2.0.16 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

11.2.0.17 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of vernal pools and the protection, enhancement and/or restoration of biologically appropriate buffers.

11.2.0.18 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats.

11.2.0.19 Provide educational resources and technical support to public and private landowners and land managers to promote the protection and/or enhancement of scrub-shrub habitats for SGCN.

11.2.0.22 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

11.2.0.23 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to SGCN habitats to promote the protection and/or enhancement of those adjacent habitats to increase the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and that connect conserved SGCN habitats.

11.2.0.24 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers on how to manage vegetated roadside areas (e.g., mowing, brush-hogging, etc.) on a schedule that avoids peak activity periods for wildlife and therefore, minimizes harm.

11.2.0.25 Provide educational resources, training programs, and on-the-ground guidance to resource managers regarding the assessment of and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) related to residential and commercial development.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.1 Engage partners and stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.3 Provide educational resources, training programs, and on-the-ground guidance to DOD to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop and implement forest management and other practices that minimize disturbances to SGCN (i.e., beyond their federal requirements).

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

11.2.2 With private landowners

11.2.2.1 Provide technical support to farming operations and woodland landowners on ways to decrease clean farming (edge-to-edge) practices and create ecotones to benefit bobwhite and other species dependent on early successional habitat.

100 Law and Policy

100. Legislation

100.1.3 Sub-national Level

100.1.3.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.3.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.4 County and Local

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.3 Expand the acreages and enhance the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN through local ordinances.

100.1.4.4 Secure wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and biologically appropriate buffers through local ordinances.

100.1.4.5 Secure SGCN-inhabited/used freshwater wetlands and biologically appropriate buffers through local ordinances.

100.1.4.7 Secure vernal pools and biologically appropriate buffers through local ordinances.

100.1.4.9 Secure existing and developing old-growth forest stands with large trees, in particular those within large, contiguous forest tracts, through local ordinances.

100.1.4.10 Secure critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through local ordinances.

100.1.4.11 Secure riparian areas through local ordinances.

100.1.4.12 Secure scrub-shrub habitats for SGCN through local ordinances.

100.1.4.13 Encourage municipal laws regulating domestic pets that may predate on wildlife.

100.1.4.14 Adopt/pass local ordinances which require assessing and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.5.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.5.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into state/local policy to minimize the impact of aquaculture on fish and wildlife.

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.1 Develop (and/or improve) policies and/or regulations that will promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

100.3.0.5 Develop policies that will promote improved and secure habitat connections between conserved SGCN habitats.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.10 Develop policies that promote protecting vernal pool habitats to benefit SGCN that rely upon them and promotes connectivity of SGCN populations.

100.3.0.11 Develop policies that will ensure the protection and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

100.3.0.12 Develop policies that promote the preservation and protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.13 Develop policies that will promote protecting and restoring riparian areas.

100.3.0.14 Develop policies and/or regulations that increase the protective buffers of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) to biologically appropriate distances to benefit SGCN that rely upon these habitats and improve the function of the [associated] aquatic systems.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.20 Develop policies and/or regulations that prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

100.3.0.21 Develop policies that minimize wildlife road mortality through: 1) Requiring the integration of wildlife passages into all new and repaired roads, in particular those areas that will connect SGCN habitats, 2) Requiring current fish/wildlife passages be improved and maintained in perpetuity, 3) Supporting seasonal road closures, in particular for unimproved roads, 4) Supporting projects that work to improve connectivity of SGCN habitats such as land conservation through acquisition or other means.

100.3.0.26 Adopt regulations requiring the combined sewer overflow alternative analyses required by regulation address potential impacts to wildlife in watercourses or receiving water bodies.

100.3.0.31 Create or expand tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMPs.

100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.

100.3.0.42 Fully adopt the former Storm water Management Rules' 300ft buffer requirements into the Flood Hazard Area Control Act Rules.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.45 Increase the controlled burn season to focus on restoring vegetative communities.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.48 Propose new State law or regulation mandating that a State-level "development impact fee" be assessed on all new development approved by municipalities (via the Municipal Land Use Law processes), and dedicate such monies to the development and implementation of regional Habitat Conservation Plans (or existing plans/programs serving the same regional function).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.53 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded rights-of-way corridors associated with energy transport/transmission.

100.3.0.57 Develop regulations that when implemented will improve and secure habitat connections between conserved SGCN habitats.

100.3.0.58 Develop regulations that when implemented will promote the expansion of acreages and enhancement of the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.61 Develop regulations that when implemented will protect vernal pool habitats to benefit SGCN that rely upon them and promotes connectivity of SGCN populations.

100.3.0.62 Develop regulations that when implemented will protect existing old-growth forest stands with large trees and/or stands that are being actively managed for old growth forests, in particular those within large, contiguous forest tracts.

100.3.0.63 Develop regulations that when implemented will preserve and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.64 Develop regulations that when implemented will protect and restore riparian areas.

100.3.0.65 Develop regulations that when implemented will protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

100.3.0.67 Develop regulations for lighting of/on tall structures that will minimize harm to and/or disorientation of wildlife, and enforce within state, county and local permitting processes.

100.3.0.68 Develop regulations that when implemented will prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

100.3.0.69 Develop regulations that when implemented will minimize wildlife road mortality.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.2 Create a policy that requires the NJ DEP to incorporate scientific information regarding climate change and sea level rise (e.g., predictions, habitat management/acquisition efforts to enhance resilience to inundation) on their websites and to work with other government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

100.4.0.4 Create a policy that requires the use of wildlife habitat and corridor mapping products for both regulatory use when conducting project reviews and planning/siting new or expanded rights-of-way projects.

100.4.0.8 Develop a white paper addressing the impacts that existing, new or expanded rights-of-way have upon wildlife, wildlife habitats and habitat connectivity.

100.4.0.9 Develop and implement policies to minimize the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats in order to benefit wildlife.

100.4.0.13 Develop policies for different circumstances (e.g., roadsides and medians, riparian, aquatic and terrestrial habitats) that outline appropriate habitat/vegetation management strategies and schedules to minimize risks to and benefit wildlife.

100.4.0.16 Develop policies to implement habitat management strategies that will increase the structural diversity surrounding areas used for energy, mining, and transportation and service corridors which include but are not limited to the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-

100.4.0.17 Develop policies to implement habitat management strategies, including prescribed burns, that will increase the structural diversity on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies to control and reduce the impacts of invasive, non-native species in order to increase structural habitat diversity.

100.4.0.18 Develop policies to minimize the extent of infrastructure associated with energy and service corridors or areas (e.g., wind and solar farms, pipelines, utility lines) and that require the implementation of habitat management strategies that will increase the structural diversity in the area including (e.g., the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides).

100.4.0.19 Develop regulations that will minimize the creation of new barriers, remove or replace current barriers with appropriately-sized systems to accommodate wildlife dispersal, and to minimize road widening and traffic volume increases within critical wildlife habitat areas.

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.21 Ensure that Section 303(d) of the Clean Water Act and applicable State statutory/regulatory requirements for surface water pollutant budgets are being met by monitoring and enforcing regulatory Total Maximum Daily Load (TMDL) targets established within regional Water Quality Management Plans.

100.4.0.22 Work with NJ DEP's Division of Land Use Regulation to ensure protection of listed species and their habitats during stream cleaning events.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Marine Turtles

Focal species that comprise this Conservation Target:

Atlantic Green Turtle | Atlantic Leatherback | Atlantic Loggerhead
Atlantic Ridley

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture (Avg. Score: 1.00)

NJ Specific Threats: 2.1.1.4 Salt hay farming on Delaware Bay marshes, and the subsequent conversion of those farms to fully tidal marshes, results in compressed sediments that are less resilient to coastal forces of erosion and sea level rise.

2.4 Marine and Freshwater Aquaculture

2.4.1 Subsistence/Artisinal Aquaculture (Avg. Score: 1.00)

NJ Specific Threats: 2.4.1.2 Increased risk of parasite introduction into marine environments.

2.4.2 Industrial Aquaculture (Avg. Score: 1.00)

NJ Specific Threats: 2.4.2.2 Increased risk of parasite introduction into marine environments.

2.4.2.3 Potential for increased nutrient and effluent loads.

3 Energy Production and Mining

3.1 Oil and Gas Facilities and Pipelines

3.1.1 Distribution processes of petroleum and other liquid hydrocarbons (Avg. Score: 2.00)

NJ Specific Threats: 3.1.1.2 Loss, alteration and/or degradation of habitat.

3.1.1.3 Increased risk of oil spills.

3.1.1.4 Increased noise pollution.

3.1.1.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.

3.1.1.6 Increased risk of collision between marine mammals, sea turtles and fish and the marine-based structures/facilities.

3.1.2 Natural gas distribution processes (Avg. Score: 2.00)

NJ Specific Threats: 3.1.2.2 Loss, alteration and/or degradation of habitat.

3.1.2.3 Increased risk of gas leaks and explosions.

3.1.2.4 Increased noise pollution.

3.1.2.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.

3.1.2.6 Increased risk of collision between marine mammals, sea turtles and fish and the marine-based structures/facilities.

3.2 Mining and Quarrying

3.2.4 Sand Dredging (outside shipping lanes) (Avg. Score: 2.00)

NJ Specific Threats:

3.2.4.1 Loss, alteration and/or degradation of benthic marine habitats.

3.2.4.2 Increased noise pollution.

3.2.4.3 Potential for direct mortality of benthic organisms.

3.3 Renewable Energy

3.3.1 Wind Power (Avg. Score: 2.00)

NJ Specific Threats:

3.3.1.1 Turbines, blades, and structure foundations create a collision risk to volant species (birds, bats and invertebrates) and marine animals.

3.3.1.3 Loss, alteration and/or degradation of habitat.

3.3.1.4 Increased commercial infrastructure.

3.4 Conventional Power Plants

3.4.0 Conventional Power Plants (Avg. Score: 2.00)

NJ Specific Threats:

3.4.0.2 Loss, alteration and/or degradation of habitat due to new or the expansion of current facilities.

3.4.0.3 Alteration of the temperature, pH and/or hydrology of aquatic ecosystems change plant communities and can harm wildlife and/or impact their behavior and survivorship.

4 Transportation and Service Corridors

4.3 Shipping Lanes

4.3.1 Movement of large ships in shipping lanes (Avg. Score: 2.00)

NJ Specific Threats:

4.3.1.1 Increased ship traffic increases the risk of wildlife mortality from strikes.

4.3.1.2 May disturb nesting and foraging of shoreline birds and aquatic animals, and/or alter migratory patterns of aquatic and marine wildlife.

4.3.2 Dredging impacts (Avg. Score: 1.00)

NJ Specific Threats:

4.3.2.3 Transportation of materials to and from disposal facilities may pose temporary disturbance to wildlife impacting foraging and nesting success.

5 Biological Resource Use

5.4 Fishing and Harvesting of Aquatic Resources

5.4.3 Unintentional effects (subsistence/small scale) (Avg. Score: 3.00)

NJ Specific Threats:

5.4.3.1 Abandoned fishing tackle and gear, crab pots without excluders and ghost crab pots increase the risk of injury and death to marine mammals, sea turtles, sea birds, pinnipeds and fish species as well as terrestrial and semi-aquatic species as a result of consuming tackle or gear, entrapment and entanglement in gear.

5.4.3.2 Commercial/recreational shellfish dredging may impact marine ecosystems by uprooting submerged aquatic vegetation, disrupting substrates, increasing turbidity, and increasing predator species in localized areas.

5.4.3.5 Trawling disrupts habitat and threatens marine species including benthic/bottom feeding fishes, invertebrates and other benthic organisms as it disrupts and homogenizes the substratum, can lead to species decline and reduced species diversity.

5.4.3.6 Fishing gear used by commercial fisheries results in bycatch or entanglement of non-targeted wildlife leading to injury and/or mortality.

5.4.3.7 Improperly sanitized equipment, relocation of fish, importation and release of non-native species, and the use of bait from a different location can spread invasive species and diseases from one waterbody to another.

5.4.3.8 Lead in fishing tackle is consumed by wildlife in the course of foraging and scavenging, causing injury and death.

5.4.4 Unintentional effects (large scale) (Avg. Score: 3.00)

NJ Specific Threats: 5.4.4.2 Commercial/recreational shellfish dredging may impact marine ecosystems by uprooting submerged aquatic vegetation, disrupting substrates, increasing turbidity, and increasing predator species in localized areas.

5.4.4.4 Trawling disrupts habitat and threatens marine species including benthic/bottom feeding fishes, invertebrates and other benthic organisms as it disrupts and homogenizes the substratum, can lead to species decline and reduced species diversity.

5.4.4.5 Fishing gear used by commercial fisheries results in bycatch or entanglement of non-targeted wildlife leading to injury and/or mortality.

5.4.4.6 Overexploitation of riparian, estuarine, and marine fisheries may deplete food resources required by marine mammals, sea turtles, marine fish and piscivorous birds, in turn resulting lower reproduction and survival.

5.4.4.7 Improperly sanitized equipment, relocation of fish, use of bait from a different location, can spread invasive species and diseases from one waterbody to another.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.2 Boating (Avg. Score: 1.00)

NJ Specific Threats: 6.1.2.1 Alteration and/or degradation of aquatic habitat.

6.1.2.2 Increased disturbance to marine animals and ocean-, bay- and marsh-associated birds which can alter their behavior decreasing the likelihood of their success and/or reproduction.

6.1.2.3 Motorized boat propellers can inflict physical harm aquatic wildlife species.

6.1.2.5 Watercraft can be a mechanism of transference of wildlife diseases and invasive plant species if gear is not properly sanitized between sites.

6.1.5 Wildlife observation and photography (Avg. Score: 1.00)

NJ Specific Threats: 6.1.5.1 Improperly conducted recreational activities may disrupt normal wildlife behaviors which can result in reduced reproductive success or survival, abandonment of critical sites, etc.

6.2 Military Exercises

6.2.1 Military exercises (Avg. Score: 2.00)

NJ Specific Threats: 6.2.1.1 Military testing and training exercises may inflict disturbance and potential physical harm to wildlife.

6.3 Work and Other Activities

6.3.1 Unauthorized research projects at significant habitats (Avg. Score: 1.00)

NJ Specific Threats: 6.3.1.1 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.2 Authorized research projects at significant habitats (Avg. Score: 3.00)

NJ Specific Threats: 6.3.2.1 Seismic air guns used during scientific marine research threatens spawning, feeding and breeding marine fishes in essential fish habitat areas off the NJ coast and may cause disturbance and physical harm to whales, dolphins, pinnipeds and sea turtles. Seismic surveys may also disturb marine mammals by disrupting navigation, foraging and communications ability.

6.3.2.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

7 Natural Systems Modifications

7.3 Other Ecosystem Modifications

7.3.1 Shoreline Stabilization (Avg. Score: 1.00)

NJ Specific Threats: 7.3.1.3 Efforts to stabilize barrier islands and shorelines, including jetties, groins, and bulkheads, degrade foraging areas for migrating whales and sea turtles.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.1.1.5 Invasive, non-native animals and plants increase the risk of introduction and transference of diseases

8.1.2 Invasive non-native aquatic animals (Avg. Score: 2.00)

NJ Specific Threats: 8.1.2.1 Parasites introduced into the marine environment can alter the reproductive and feeding behavior of native wildlife, leading to their decline.

8.1.2.2 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminishing habitat suitability and reducing ecological integrity of natural communities, and may introduce disease into a population.

8.1.3 Invasive non-native aquatic plants (Avg. Score: 1.00)

NJ Specific Threats: 8.1.3.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.6 Invasive non-native fungal/bacterial diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.1.6.1 The introduction of non-native fungal and bacterial diseases threatens native populations and ecosystems.

8.2 Problematic Native Species/Diseases

8.2.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.2.1.2 Invasive pathogens and insects may increase in range and abundance as limiting factors (such as temperature) are altered as a result of climate change.

8.4 Problematic Species/Diseases of Unknown Origin

8.4.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.4.1.1 Non-native or poorly understood diseases and parasites could potentially impact native animals.

8.5 Viral/Prion-induced Diseases

8.5.1 Unspecified Species (Disease) (Avg. Score: 1.00)

NJ Specific Threats: 8.5.1.1 There is a large knowledge gap regarding the existence of, or potential for, other diseases impacting native wildlife.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.1 Domestic and Urban Waste Water

9.1.1 Sewage (Avg. Score: 2.00)

NJ Specific Threats: 9.1.1.1 Degradation of aquatic and marine water quality and habitats by changing turbidity, flow and water chemistry.

9.1.1.2 Leads to increased eutrophication and algae blooms that result in oxygen depletion.

9.1.1.3 Contaminants in sewage treatment effluents and Combined Sewer Overflows can cause developmental and behavioral abnormalities and reproductive failure in wildlife.

9.1.2 Run-off (Avg. Score: 2.00)

NJ Specific Threats: 9.1.2.1 Chemical fertilizers and nutrient run-off changes the pH in streams and ponds and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.1.2.2 Contaminants degrade aquatic and marine water quality and can bioaccumulate in benthic organisms, threatening wildlife by causing developmental and behavioral abnormalities and reproductive failure.

9.1.2.3 Contaminants from road runoff (oil, sediment, salt, etc.) impact native vegetation and the species that rely upon them, degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2 Industrial and Military Effluents

9.2.1 Oil Spills (Avg. Score: 3.00)

NJ Specific Threats: 9.2.1.1 Oil spills render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.1.2 Oil spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.1.3 Oil spills cause external oiling of wildlife and ingestion of oil, both of which can injure or kill wildlife.

9.2.3 Other (Avg. Score: 3.00)

NJ Specific Threats: 9.2.3.1 Point and nonpoint source pollution such as polychlorinated biphenyls (PCBs), pesticides, heavy metals, and endocrine disrupting compounds (EDC's) into freshwater and marine systems pose threats to wildlife through direct contact and/or ingestion, and to aquatic species and their predators through bioaccumulation, impacting the reproductive success and neurological function of many avian and fish species.

9.2.3.2 Chemical spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.3.3 Chemical spills may render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.3 Agricultural and Forestry Effluents

9.3.1 Nutrient Loads (Avg. Score: 1.00)

NJ Specific Threats: 9.3.1.1 Chemical fertilizers and nutrient run-off changes the pH in streams, ponds and wetlands and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.3.1.3 Organic nutrient inputs from aquaculture may, depending upon type and location, adversely impact intertidal and subtidal habitats and water bodies where there is insufficient tidal flushing.

9.3.3 Herbicides and Pesticides (Avg. Score: 1.00)

NJ Specific Threats: 9.3.3.1 Pesticides degrade terrestrial and aquatic habitats, especially streams, ponds and wetlands. Aquatic wildlife are particularly sensitive to these contaminants, which can cause developmental and behavioral abnormalities and reproductive failure. Some contaminants may bioaccumulate in predatory fish and birds and disrupt reproduction.

9.4 Garbage and Solid Waste

9.4.1 Direct hazards to wildlife (Avg. Score: 3.00)

NJ Specific Threats: 9.4.1.1 Wildlife may ingest garbage causing choking or impingement in the digestive system, or they may become physically entangled in it (e.g., plastic or abandoned fish nets); conditions that make them unable to feed or drink, cause them to suffocate or drown, or otherwise restrict the animal's movement making them more susceptible to predators, starvation or injury.

9.5 Air-Bourne Pollutants

9.5.1 Acid Rain (Avg. Score: 2.00)

NJ Specific Threats: 9.5.1.1 Causes acidification of water bodies, resulting in changes to aquatic and marine communities and reducing biodiversity, and creating conditions that are unsuitable for some aquatic (freshwater and marine) and semi-aquatic species that are sensitive to pH shifts.

9.5.6 Herbicides and Pesticides (Avg. Score: 1.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

9.6 Excess Energy

9.6.1 Light Pollution (Avg. Score: 1.00)

NJ Specific Threats: 9.6.1.1 Artificial lighting can reduce suitability of adjacent habitat for species sensitive to artificial lights by disorienting wildlife, reducing foraging suitability or success, or increasing visibility to predators, resulting in reduced diversity and/or productivity of species in adjacent habitat.

9.6.2 Thermal Pollution (Avg. Score: 2.00)

NJ Specific Threats: 9.6.2.1 Water temperature changes due to industrial discharge of heated water may impact species composition in the receiving waterbody. Species such as sea turtles and migrating fish may be attracted to the thermal plume and become more vulnerable to mortality during emergency shutdowns during cooler months.

9.6.3 Noise Pollution (Avg. Score: 2.00)

NJ Specific Threats: 9.6.3.1 Acute and chronic noise pollution in and adjacent to terrestrial and aquatic (marine and freshwater) environments could disrupt normal behaviors of wildlife such as migration, communication, feeding, eluding predators, resting and breeding, etc.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 1.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.3 Temperature Extremes

11.3.1 Temperature extremes (Avg. Score: 2.00)

NJ Specific Threats: 11.3.1.3 Temperature extremes of surface water and air degrades marine habitats and ecosystems, threatening marine wildlife. Such extremes also disrupt offshore currents and migratory patterns, species' ranges, and/or impact communities/food chains, all of which further impact the ecosystem.

11.3.1.4 Extremely low temperatures and/or extensive periods of unseasonably low temperatures during critical life history stages (e.g., hibernation, gestation/nesting) can alter animals' behaviors and decrease survivorship.

11.4 Storms and Flooding

11.4.1 Storms and flooding (Avg. Score: 2.00)

NJ Specific Threats: 11.4.1.1 Extreme storms and flooding events threaten aquatic and marine wildlife through habitat degradation and alteration, including alterations to off-shore or back-bay benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic and marine wildlife.

11.4.1.2 Potentially damage coastal habitats, including beach- and marsh-nesting bird habitats and interdunal wetlands, and can increase marsh erosion.

11.4.2 Increased rainfall (Avg. Score: 1.00)

NJ Specific Threats: 11.4.2.1 Extreme rain events threaten aquatic wildlife through habitat degradation and alteration, including alterations to benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic wildlife.

11.6 Phenology Shifting or Alteration

11.6.2 Phenology shifts related to predator-prey ecology (Avg. Score: 1.00)

NJ Specific Threats: 11.6.2.2 Shifts timing of species migration, breeding and hibernation, and available food resources, causes redistribution of species, or mortality for species that are unable to relocate due to their already isolated habitat or limited mobility.

11.6.3 Phenology shifts related to species redistribution (Avg. Score: 1.00)

NJ Specific Threats: 11.6.3.1 Shifts in timing of species migration, breeding and hibernation, and available food resources, as a result of wildlife range shifts driven by climate change.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 2.00)

NJ Specific Threats: 12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.1.6 Lack of information regarding migratory pathways and response of wildlife to lights and noise associated with offshore wind turbines.

12.1.2 Lack of up-to-date existing information (Avg. Score: 2.00)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.3 Need to answer research question (Avg. Score: 1.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.4 Need to develop new technique (Avg. Score: 1.00)

NJ Specific Threats: 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 1.00)

NJ Specific Threats: 12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

12.4.0.4 Lack of a mandatory reporting system for lost crab traps threatens diamondback terrapins and other marine species due to persistent trapping/attraction of organisms by ghost pots.

12.4.0.6 Techniques for ecological management or restoration of shorelines are not fully developed or evaluated for effectiveness for target and non-target SGCN in coastal areas.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 2.00)

NJ Specific Threats: 14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 2.00)

NJ Specific Threats: 14.2.1.2 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various aquatic and riparian management practices.

14.2.1.3 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various coastal management practices.

14.2.1.4 Need to develop greater understanding of and support for efforts implemented to maintain disturbance-free habitats that allow coastal wildlife populations to thrive alongside human residential and recreational uses.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 2.00)

NJ Specific Threats: 15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.3 Secure and promote the protection/restoration of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through incentive programs.

1.2.1.14 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of herbicides and pesticides, and implementing more ecologically safe strategies when using such products.

1.2.1.25 Create incentives (non-monetary and/or monetary) within State regulations to assist and programs to deliver those incentives to aquaculture growers to relocate, for example, from intertidal to subtidal lease areas through buyouts of leases or microloans, and/or promoting on-lease conservation measures used by aquaculture growers (such as the implementation of conservation easements, use of living shorelines, incorporation of BMPs for habitat protection, etc.) for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2 Direct Management of Natural Resources

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.4 Restore and/or enhance suitable travel corridors connecting conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.8 Protect significant natural and/or unique communities by implementing best management practices when conducting habitat restoration strategies.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.10 Minimize the loss of important habitats (e.g., coastal scrub-shrub and grassy habitats, high and low marsh habitats, etc.) that provide nesting, migrating, and wintering areas for SGCN birds and other coastal and marsh-dependent species through habitat restoration efforts.

2.10.0.11 Restore and/or enhance critical migratory terrestrial and aquatic habitats (e.g., beach, grasslands, forest, scrub-shrub, etc.) for songbirds, raptors, shorebirds, waterfowl, bats and invertebrates through habitat restoration efforts and expand habitat restoration to adjacent private lands to increase the effective size of the habitat.

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.16 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.11.0.35 Increase structural habitat diversity by managing vegetation adjacent to aquatic habitats in a manner that provides a buffer from runoff and erosion and a microclimate to stabilize seasonal temperatures to benefit a variety of aquatic and semi-aquatic species.

2.11.0.44 Manage phragmites adjacent to coastal marshes of interest, in particular those that are within underdeveloped areas and are unprotected, through herbicide application and water management to improve resiliency of the marshes to sea level rise.

2.12 Water management

2.12.1 Ditch plugs

2.12.1.1 Implement best management practices (BMPs), protective strategies, and guidelines for ditch plugging to maintain and enhance healthy, resident and migratory SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.6 Conduct long-term studies on resident and migratory SGCN to determine if there are changes to the populations' demography (productivity, survival, dispersal) and/or to their critical and/or supporting habitats (i.e., diminishing in value, acreage or connectivity, etc.), in particular changes that would not maintain SGCN at viable levels for species populations. Update data and GIS maps; provide updated information to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.21 Conduct long-term monitoring to determine the impacts of the fish and shellfish aquaculture industries on focal and non-focal SGCN and their habitats (i.e., NJ bays, estuaries, ocean areas). Assess the success of management actions implemented to minimize these impacts and make specific recommendations to the NJ DEP regarding how such management efforts may be improved to minimize harm to wildlife and their habitats.

3.0.0.23 Identify (through wildlife and aquatic system surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and research water quality parameters for all [types of] aquatic systems for various SGCN populations.

3.0.0.27 Evaluate the effectiveness of strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals through research and monitoring. Develop and provide NJ DEP and other appropriate governing agencies/commissions a summary of findings and recommendations to improve such efforts.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.2 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.0.16 Conduct long-term monitoring to evaluate the success of marine conservation zone designations on marine SGCN.

3.2.0.17 Conduct monitoring at constructed wind farms (within or outside of NJ) to assess the impacts on migratory species (birds, bats, insects) and determine if NJ's land use planning efforts and/or smart-growth plans need to be revised.

3.2.0.19 Develop, implement and evaluate aquaculture practices in coastal areas that are compatible with the recovery of SGCNs and industry needs.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.3 Baseline inventory

3.2.3.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) suitable areas for marine conservation zone designation and promote policies and regulations that support the designation of such areas.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.11 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the quality and importance of areas with submerged aquatic vegetation to benefit waterfowl, finfish, and shellfish species.

3.3.1.15 Conduct a literature review to determine the potential impacts of underwater vibrational noise on marine mammals, sea turtles and fishes emanating from offshore wind turbines during routine operations.

3.3.1.16 Gather "best information" for spatial modeling and update/create a current model/depiction of anticipated habitat shifts from sea-level rise, flooding, etc.

3.3.1.27 Develop a matrix that lists every commercial and recreational fishery and aquaculture facility that operates in state waters and for each fishery listed, provide details regarding their fishing seasons, gear descriptions, locations and number of fishers. Add a GIS component to overlay species of concern and sensitive areas.

3.3.1.29 Identify coastal wildlife habitats unimpacted by development and/or at greatest risk of habitat loss to help guide enlightened coastal stabilization efforts (i.e., use of soft stabilization) to reduce the impacts on wildlife and their habitats.

3.3.1.30 Using available data, model a comprehensive Marine Submerged Aquatic Vegetation Mapping project (similar to the Statewide freshwater wetlands mapping project) of sufficient quality and integrity that it could support the NJ DEP's coastal regulatory programs. Continue to conduct surveys to gather additional data to test and improve the model.

3.3.2 Monitoring

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.5 Conduct long-term monitoring of water quality of SGCN aquatic habitats (and aquatic systems feeding into those habitats) to evaluate protection and management efforts to reduce, if not eliminate, chemical contamination, siltation, eutrophication, and other forms of pollution/contamination of aquatic systems.

3.3.2.14 Research and evaluate the effectiveness of water quality management practices on water-dependent and semi-dependent SGCN, particularly those practices associated with permitting or mitigation actions.

3.3.2.23 Conduct long-term monitoring of marine submerged aquatic vegetation and update the Marine Submerged Aquatic Vegetation Mapping [to be developed under baseline activities] to provide the NJ DEP's coastal regulatory programs with the most current data.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.8 Develop best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.12 Develop management actions to minimize the documented adverse impacts and reduce risks of potential adverse impacts of aquaculture on migratory shorebirds and other SGCN, including waterfowl, finfish, and shellfish and their habitats.

3.5.3.13 Developing engineering standards that embrace both shore protection/resiliency and habitat creation for shorebirds, horseshoe crabs and other coastal species along the Atlantic and Delaware Bay coasts.

3.5.3.14 Develop aquaculture practices in the coastal areas that are compatible with the recovery of SGCN.

3.5.3.16 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.3.27 Conduct an assessment and develop a location list of available equipment for boom deployment during oil spills.

3.5.3.28 Conduct baseline surveys to determine areas in Barnegat and Great bays appropriate for eelgrass restoration. Develop necessary techniques to implement restoration efforts.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.11 Develop aquaculture practices in the Delaware Bay that are compatible with the recovery of SGCN.

3.5.4.12 Investigate and develop strategies to reduce "by-catch" of SGCN and other non-target species. Present findings and strategies to NJ DEP and conservation organizations for review and possible implementation. Develop a database documenting by-catch for use in management planning decisions.

3.5.4.13 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.17 Investigate new, non-invasive techniques for SGCN population evaluation through literature review, expert opinion, trial studies (if low risk), etc.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

3.5.4.22 Investigate the efficacy of implementing strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities.

3.5.4.23 Reduce the impacts of entrainment, impingement and thermal discharge at power plants by working with conservation partners, academia, etc. to ensure that best available technologies are utilized wherever possible.

4 Education

4.1 Educator/Instructor training

4.1.1 Aquatic resource education

4.1.1.1 Provide educational resources and training programs to teachers in aquatic resource education that includes information regarding climate change and sea-level rise for incorporation into the class curriculum and/or as the focus of school field trips.

4.1.1.2 Provide educational resources and training programs to teachers in aquatic resource education that includes information regarding how coastal stabilization negatively impacts wildlife by preventing natural processes for incorporation into the class curriculum and/or as the focus of school field trips.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.5 Secure and protect critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.3 Increase the protection of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through conservation area designations.

6.3.0.5 Promote the protection of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through conservation area designations.

6.3.0.9 Promote the protection of critical marine habitats for SGCN through conservation area designations.

7 Law Enforcement

7.1 Law enforcement

7.1.3 Sub-national Level

7.1.3.1 Enforce slow wake zones and marine conservation area regulations to protect aquatic vegetation.

7.1.3.2 Increase the number of law enforcement officers tending to wildlife issues to a reasonable number to sufficiently cover the State and marine waters.

7.1.4 Scale Unspecified

7.1.4.1 Improve enforcement of policies and/or regulations that promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

7.1.4.4 Improve enforcement of policies/regulations aimed at protecting and preserving critical coastal and marsh habitats, and secure mitigation for losses that create an environmental benefit.

7.1.4.5 Enforce current policies and/or regulations to increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal SGCN, and implement and enforce amended policies/regulations.

7.1.4.7 Increase law enforcement presence to enforce regulations governing recreational activities (e.g., the use of personal watercraft and off road vehicles, caving, rock climbing, etc.) on conserved lands and within other sensitive habitats, and discourage activities that cause harm or disturbance to vegetation, wetlands, fish and wildlife.

7.1.4.11 Implement and enforce policies/regulations that will increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.17 Improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

7.1.4.20 Implement policies and/or regulations with the objective of reducing "by-catch" of SGCN and other non-target species.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.1 Coordinate research efforts among government agencies, non-government conservation partners and other stakeholders to investigate the impacts of aquaculture on migratory shorebirds, waterfowl, finfish, shellfish and other SGCN and their habitats, to determine relative effects of farming locations and aquaculture techniques, and to evaluate management actions to minimize such impacts.

8.1.0.2 Develop a team of personnel from government entities, conservation organizations and other stakeholders engaged in oil/gas spill response for marine and freshwater habitats to develop a feasible plan for oil spill response and/or to amend NJ's current oil spill response plan that clearly outlines each organizations responsibilities and an assessment and location list of available equipment for boom deployment during oil spills.

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.1.0.5 Engage government agencies, conservation partners and other stakeholders in discussions focused on establishing a long-term monitoring program for submerged aquatic vegetation distribution throughout Barnegat, Little Egg Harbor and Great Bay.

8.1.0.6 Engage government agencies, conservation partners and other stakeholders in discussions focused on sharing information regarding coastal and marine critical wildlife habitats, developing comprehensive mapping to assist in reducing impacts of energy production activities, and establishing a long-term monitoring program to update the data. Ensure this information is available to appropriate personnel for planning or response measures.

8.1.0.7 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting coastal boating and recreation communities about eelgrass/widgeongrass, their impacts on marine environments, and the value, fragility and location of submerged aquatic vegetation beds and habitats.

8.1.0.11 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting sportsmen's organizations and fisheries, as well as public constituents, addressing the unintended effects abandoned fishing gear, tackle and crab pots can have on wildlife, and promote the collection and/or reporting of abandoned items and their locations.

8.1.0.12 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting sportsmen's organizations and fisheries, as well as public constituents, addressing the unintended effects fishing gear and tackle can have on wildlife.

8.1.0.14 Engage DOD in a constructive dialogue regarding strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.23 Work with the NJ Division of Fish and Wildlife's Bureau of Marine Fisheries, local recreational and commercial fisheries associations, and fishers to develop a process that encourages fishermen to report the number and location of lost pots to the appropriate state agency/agencies at the end of the harvest season.

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.31 Encourage government agencies, conservation partners and other stakeholders to work together to create GIS mapping for marine wildlife and habitat to assist in reducing impacts of energy production activities. Ensure this information is available to appropriate personnel for planning or response measures.

8.1.0.36 Reduce "by-catch" of SGCN and other non-target species by enlisting voluntary cooperation to use exclusion devises, appropriate trap sizes, etc. through education and outreach.

8.1.0.40 Encourage researchers, land managers, naturalists and enthusiasts to follow proper procedures for the coordination and/or permitting of research/management activities involving wildlife and sensitive habitats, and discourage activities that alter vegetation or wetlands, or cause harm or disturbance to wildlife.

8.1.0.42 Engage citizens, wildlife observers and photographers through discussions and distributable information regarding the importance of and encouraging implementing responsible and ethical behavior when observing wildlife by developing an alliance of wildlife photographers and widely circulating recommendations on how to reduce impact.

8.1.0.46 Form cooperative partnerships with dredging companies to facilitate habitat creation and enhancement within project areas, and to identify seasonal timing of activities that would minimize impacts to wildlife and their habitats.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.1.0.48 Form cooperative partnerships with transportation and shipment agencies and companies to facilitate habitat creation and enhancement away from and outside of project areas and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.1.0.49 Reduce the impacts of entrainment, impingement and thermal discharge at power plants by working with conservation partners, academia, etc. to ensure that best available technologies are utilized wherever possible.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.2 Utilize WSFR grant funds, in combination with alternate funding sources as needed, to implement an extensive educational/outreach program consisting of displays, fliers, list-serve mailings, Facebook posts and speaking engagements with sportsmen's organizations and fisheries, as well as public constituents, addressing the unintended effects fishing gear and tackle can have on non-target species.

8.3.0.4 Utilize WSFR grant funds, in combination with alternate funding sources as needed, to implement an extensive educational/outreach program consisting of displays, fliers, list-serve mailings, Facebook posts and speaking engagements with sportsmen's organizations and fisheries addressing the unintended effects abandoned fishing gear, tackle and crab pots can have on wildlife.

8.3.0.8 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate recreationists and encourage landowners to eliminate garbage in the vicinity of suitable wildlife habitat, in particular SGCN habitat. Information should include the detrimental impacts garbage may have on various wildlife species.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.14 Develop an educational outreach program using a variety of media to ensure maximizing the distribution of information, in particular targeting sportsmen's organizations and fisheries, regarding the unintended effects abandoned fishing gear, tackle and crab pots can have on wildlife, including non-target species.

8.3.0.15 Develop an educational outreach program for citizens regarding: 1) The impacts to wildlife as a result of plastic bags entering aquatic and marine systems, 2) The importance of decreasing the amount of plastic shopping bags in circulation, 3) The need for businesses to voluntarily charge for bags or reimburse people for using their own non-plastic bags, and 4) The need for their assistance through public pressure on legislators and government to pass legislation that that limits the amount of plastic shopping bags in circulation.

8.3.0.18 Develop an Eelgrass/Widgeon Grass education and mapping program to educate coastal boating and recreation communities about the value, fragility and location of submerged aquatic vegetation beds and habitats.

8.3.0.20 Develop an educational outreach program for landowners, particularly those in the coastal and bay areas, boaters, and the general public with information about the negative impacts on marine wildlife and habitats, and steps they can implement to reduce these impacts.

8.3.0.21 Develop an educational outreach program for the general public, in particular those within and adjacent to coastal and riparian areas on the realities of sea-level rise to help citizens living in these areas understand how this will affect them, how coastal stabilization negatively impacts wildlife by preventing natural processes, and how their decisions impact species.

8.3.0.22 Post signage in sensitive coastal habitats (e.g., bird and Diamondback Terrapin nesting areas) to educate the boating community on responsible use of these areas.

8.3.0.23 Develop an educational outreach program for coastal municipalities and residents to promote an understanding of the benefits of soft structures over hard structures for shoreline stabilization.

8.3.0.29 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about the importance of maintaining a vegetative buffer along riparian and aquatic habitats to intercept storm water runoff and minimize soil erosion.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.8 Develop a plan that focuses on strategies for oil pipelines to avoid sensitive habitats that would be highly impacted by oil spills.

9.1.0.17 Develop a plan to minimize nutrient and effluent loads from aquaculture practices.

9.1.0.26 Develop a plan to minimize any adverse impacts of aquaculture farming techniques and structures on freshwater and intertidal habitats.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.32 Incorporate aquatic habitat connectivity and water quality/effluent standards into local and state aquaculture plans and BMPs.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.6 Amend NJ's current oil spill response plan to 1) expand the geographic area addressed, 2) expand the targeted species impacted and in need of recovery, and 3) revise current and integrate new actions into the plan as needed.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.15 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.1.16 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.2 Listed species recovery planning

9.3.2.1 Develop proactive species recovery plans for all endangered and threatened species including guidance and objectives pertaining to critical and supporting habitat to meet and maintain recovery goals.

9.3.3 Habitat management planning

9.3.3.6 Develop a management plan for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.12 Develop a management plan using engineering standards that embrace both shore protection/resiliency and habitat creation for shorebirds, horseshoe crabs and other coastal species along the Atlantic and Delaware Bay coasts.

9.3.3.13 Develop a management plan that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas and prevents or ameliorates near-term impacts of climate change throughout the State, but in particular within the coastal and Delaware Bay areas.

9.3.3.14 Develop a management plan using aquaculture practices in coastal areas that are compatible with the recovery of SGCN.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.16 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.21 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.3.24 Develop a plan to improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

9.3.3.25 Develop a habitat management plan focused on areas important to near-shore, coastal species (e.g., herring, sturgeon, terrapin, nesting birds) that prioritizes these areas to direct resources to minimize the impacts of sea-level rise, flooding and storms (including extreme rain events) such as increased erosion of beach, mudflat and marsh habitats, and the increased risk of saltwater intrusion into freshwater habitats. Gather "best information" for spatial modeling of anticipated habitat shifts from sea-level rise, flooding, etc.

9.3.3.28 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.3.32 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.11 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed offshore energy projects relating to drilling, extraction and distribution of petroleum and gas products to reduce habitat destruction and minimize impacts on wildlife.

11.1.1.13 Use the best available science (species data, habitat present, wind farm layout options, wind blade impacts on migratory species, location of migration routes, etc.) when conducting regulatory reviews of proposed wind farm projects to minimize impacts on migratory and resident wildlife and reduce habitat fragmentation.

11.1.2 Review of proposed policies and plans

11.1.2.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into the environmental review process to help establish policies and plans that minimize the impact of aquaculture on fish and wildlife.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.

11.2.0.14 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters), and to enhance or restore biologically appropriate buffers.

11.2.0.15 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and landowners about the importance of retaining and in an effort to protect, create, enhance and/or restore vegetation along aquatic habitats.

11.2.0.20 Provide educational resources and technical support to public and private landowners and land managers to promote the protection and/or enhancement of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN.

11.2.0.25 Provide educational resources, training programs, and on-the-ground guidance to resource managers regarding the assessment of and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) related to residential and commercial development.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.0.27 Provide educational resources and presentations to coastal municipalities and residents to promote the understanding of the benefits of soft structures over hard structures for shoreline stabilization.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.1 Engage partners and stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.4 Provide educational resources, training programs, and on-the-ground guidance to dredging companies and resource managers on habitat creation and enhancement away from and outside of shipping lanes, and to identify seasonal timing of activities that would minimize impacts to wildlife and their habitats.

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

100 Law and Policy

100. Legislation

100.1.3 Sub-national Level

100.1.3.4 Initiate legislative action to establish an annual budgetary line item designating funds to support programs and monitoring stations throughout Barnegat, Little Egg Harbor and Great Bay focused on long-term monitoring of submerged aquatic vegetation, both native and exotic species.

100.1.4 County and Local

100.1.4.4 Secure wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and biologically appropriate buffers through local ordinances.

100.1.4.8 Secure critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through local ordinances.

100.1.5 Scale Unspecified

100.1.5.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into state/local policy to minimize the impact of aquaculture on fish and wildlife.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.1 Develop (and/or improve) policies and/or regulations that will promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

100.3.0.2 Improve policies/regulations aimed at protecting and preserving critical coastal and marsh habitats and securing mitigation for losses that create an environmental benefit.

100.3.0.4 Promote policies and regulations that support marine conservation zone designations in suitable areas identified through research and literature.

100.3.0.7 Amend current policies and/or regulations to increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.14 Develop policies and/or regulations that increase the protective buffers of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) to biologically appropriate distances to benefit SGCN that rely upon these habitats and improve the function of the [associated] aquatic systems.

100.3.0.17 Develop and implement policies and/or regulations with the objective of reducing "by-catch" of SGCN and other non-target species.

100.3.0.23 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.26 Adopt regulations requiring the combined sewer overflow alternative analyses required by regulation address potential impacts to wildlife in watercourses or receiving water bodies.

100.3.0.27 Amend harvest, license and/or permit requirements to incorporate guidance regarding the use of gear and/or tackle and current best practices to minimize bycatch or entanglement of non-target species.

100.3.0.28 Amend harvest, license and/or permit requirements to require mandatory reporting by permittees/licensees of lost harvest gear, by-catch and, entanglement of non-target species.

100.3.0.29 Amend harvest, license and/or permit requirements to incorporate the exclusion devices and/or to require trap/pot designs with a quick-corrode feature which would render the device ineffective upon short-term sustained submersion.

100.3.0.30 Amend the NJ Bureau of Marine Fisheries commercial licensing and harvest reporting system to require fishermen to report the number and location of lost pots to the appropriate state agency/agencies at the end of the harvest season.

100.3.0.37 Develop a law and/or policy that requires NJ DEP to continue to address and correct the allowable combined sewer overflow inputs of solid waste into the marine environment to minimize harm to wildlife and their habitats.

100.3.0.38 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.3.0.39 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.47 Investigate regulatory options available to direct the location of aquaculture activities in Aquaculture Development Zone 4 (Delaware Bay area) in a manner which minimizes the loss of wildlife habitats and adverse impacts to the environment.

100.3.0.49 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address the issue of disturbance to habitat or species as a result of human activities (e.g., construction, bridge maintenance, road work, etc.).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.59 Develop regulations that when implemented will increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.66 Develop regulations with the objective of reducing "by-catch" of SGCN and other non-target species.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.5 Create a policy that requires an initial and subsequent updates of a comprehensive marine submerged aquatic vegetation mapping for use by NJ DEP's coastal regulatory program.

100.4.0.7 Develop a law and/or policy that requires NJ DEP to continue to address and correct the allowable combined sewer overflow inputs of solid waste into the marine environment to minimize harm to wildlife and their habitats.

100.4.0.10 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.4.0.11 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.4.0.21 Ensure that Section 303(d) of the Clean Water Act and applicable State statutory/regulatory requirements for surface water pollutant budgets are being met by monitoring and enforcing regulatory Total Maximum Daily Load (TMDL) targets established within regional Water Quality Management Plans.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Northern Black Racer

Focal species that comprise this Conservation Target:

Northern Black Racer

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:

- 1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.1.1.2 Loss, alteration and/or degradation of habitat.
- 1.1.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.
- 1.1.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.
- 1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:

- 1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.2.1.2 Loss, alteration and/or degradation of habitat.
- 1.2.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.
- 1.2.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.
- 1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats:

- 1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.3.1.2 Loss, alteration and/or degradation of habitat.
- 1.3.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.
- 1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture (Avg. Score: 2.00)

NJ Specific Threats:

- 2.1.1.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.2 Small-holder Farming (Avg. Score: 1.00)

NJ Specific Threats: 2.1.2.2 Fragments terrestrial and aquatic habitats.

2.1.2.4 Agricultural practices (e.g., mechanized, row-crop agriculture) can cause direct mortality to wildlife when harvesting takes places.

2.1.3 Agro-industry (Avg. Score: 2.00)

NJ Specific Threats: 2.1.3.2 Fragments terrestrial and aquatic habitats.

2.1.3.3 Agricultural practices (e.g., mechanized, row-crop agriculture) can render lands unsuitable for most wildlife due to soil degradation and erosion.

2.2 Wood and Pulp Plantations

2.2.1 Small Holder (Avg. Score: 2.00)

NJ Specific Threats: 2.2.1.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.2.1.2 Tree harvesting can cause direct mortality to wildlife, especially if done during peak activity periods or vulnerable life stages (e.g., denning, nesting, gestation/birthing, basking, roosting, pre-volancy, etc.).

2.2.2 Agro-industry Plantations (Avg. Score: 2.00)

NJ Specific Threats: 2.2.2.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.2.2.2 Tree harvesting can cause direct mortality to wildlife, especially if done during peak activity periods or vulnerable life stages (e.g., denning, nesting, gestation/birthing, basking, roosting, pre-volancy, etc.).

2.3 Livestock Farming and Ranching

2.3.2 Small-holder Grazing (Avg. Score: 1.00)

NJ Specific Threats: 2.3.2.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.3 Agro-industry Grazing (Avg. Score: 2.00)

NJ Specific Threats: 2.3.3.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

3 Energy Production and Mining

3.1 Oil and Gas Facilities and Pipelines

3.1.1 Distribution processes of petroleum and other liquid hydrocarbons (Avg. Score: 2.00)

NJ Specific Threats: 3.1.1.1 Fragments terrestrial and aquatic habitats.

3.1.1.2 Loss, alteration and/or degradation of habitat.

3.1.1.3 Increased risk of oil spills.

3.1.1.4 Increased noise pollution.

3.1.1.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.

3.1.1.6 Increased risk of collision between marine mammals, sea turtles and fish and the marine-based structures/facilities.

3.1.2 Natural gas distribution processes (Avg. Score: 2.00)

NJ Specific Threats: 3.1.2.1 Fragments terrestrial and aquatic habitats.

3.1.2.2 Loss, alteration and/or degradation of habitat.

3.1.2.3 Increased risk of gas leaks and explosions.

3.1.2.4 Increased noise pollution.

3.1.2.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.

3.1.2.6 Increased risk of collision between marine mammals, sea turtles and fish and the marine-based structures/facilities.

3.2 Mining and Quarrying

3.2.2 Surface Mining - Rock Quarry (and sand quarries) (Avg. Score: 2.00)

NJ Specific Threats:

3.2.2.1 Fragments terrestrial and aquatic habitats.

3.2.2.2 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

3.2.2.3 Increased risk of vehicle strikes/mortality to wildlife.

3.3 Renewable Energy

3.3.1 Wind Power (Avg. Score: 2.00)

NJ Specific Threats:

3.3.1.2 Fragments terrestrial habitats.

3.3.1.3 Loss, alteration and/or degradation of habitat.

3.3.1.4 Increased commercial infrastructure.

3.3.2 Solar Power (Avg. Score: 3.00)

NJ Specific Threats:

3.3.2.1 Fragments terrestrial habitats.

3.3.2.2 Loss, alteration and/or degradation of habitat.

3.3.2.3 Increased commercial infrastructure.

3.4 Conventional Power Plants

3.4.0 Conventional Power Plants (Avg. Score: 1.00)

NJ Specific Threats:

3.4.0.2 Loss, alteration and/or degradation of habitat due to new or the expansion of current facilities.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:

4.1.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species and inhibiting dispersal of non-volant animals, reducing gene flow.

4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.1.1.3 Re-establishment of abandoned railroad lines may displace wildlife, in particular, less mobile species using the area to fulfill critical life history requirements.

4.1.1.4 Re-establishment of abandoned railroad lines may increase the risk of direct mortality on wildlife.

4.1.2 Movement of cars and other vehicles on roads and railroads (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:

4.1.2.1 Increased vehicle traffic increases the risk of wildlife mortality from strikes.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads (Avg. Score: 2.00)

NJ Specific Threats: 4.2.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species, inhibiting dispersal of non-volant animals, reducing gene flow, and creating barriers to fish when service line-associated roads cross streams (e.g., bridges, culverts, fords, etc.).

4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

4.2.2 Management of rights-of-way or communication tower facilities and/or their associated access roads (Avg. Score: 2.00)

NJ Specific Threats: 4.2.2.1 Improper or poorly scheduled vegetation management can cause direct mortality to and may reduce productivity of wildlife.

5 Biological Resource Use

5.1 Hunting and Collecting Terrestrial Animals

5.1.1 Intentional Use (Avg. Score: 2.00)

NJ Specific Threats: 5.1.1.1 Illegal collection of wildlife can have detrimental impacts on populations.

5.1.3 Persecution/Control (Avg. Score: 3.00)

NJ Specific Threats: 5.1.3.1 Wanton killing of perceived dangerous and/or undesirable animals.

5.2 Gathering Terrestrial Plants

5.2.2 Unintentional effects (Avg. Score: 1.00)

NJ Specific Threats: 5.2.2.1 Stepping on nests or young/hatchling animals.

5.3 Logging and Wood Harvesting

5.3.1 Intentional Use (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.1.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.1.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.1.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.2 Intentional Use (large scale) (Avg. Score: 2.00)

NJ Specific Threats: 5.3.2.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.2.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.2.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.3 Unintentional effects (subsistence/small scale) (Avg. Score: 2.00)

NJ Specific Threats: 5.3.3.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4 Unintentional effects (large scale) (Avg. Score: 2.00)

NJ Specific Threats: 5.3.4.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4.2 Extensive infrastructure and larger equipment requirements present a potential risk of direct injury/mortality to wildlife.

5.3.4.5 Lack of appropriate, sustainable forest management can lead to a decrease in forest habitat diversity, degraded habitat for many forest species, the loss of habitat for early-successional species, and/or the loss of unique habitats for species that need canopy breaks and multi-aged tree composition to fulfill various life history requirements.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized) (Avg. Score: 2.00)

NJ Specific Threats: 6.1.1.1 Inappropriate use of off-road vehicles creates new roads/trails which fragments habitat.

6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.

6.1.1.3 Increased risk of harassment that results in a change in wildlife behavior and/or direct mortality from vehicle strikes.

6.1.1.4 Increased noise pollution.

6.1.1.6 Off-road vehicles can be a mechanism of transference of wildlife diseases and invasive plant species if gear and apparel are not properly sanitized between sites.

6.1.5 Wildlife observation and photography (Avg. Score: 1.00)

NJ Specific Threats: 6.1.5.1 Improperly conducted recreational activities may disrupt normal wildlife behaviors which can result in reduced reproductive success or survival, abandonment of critical sites, etc.

6.1.5.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.1.6 Recreational use of cliffs, rocks and ridgelines (Avg. Score: 1.00)

NJ Specific Threats: 6.1.6.3 Recreational use of rock outcrops and ridgelines by hikers and bikers can lead to direct mortality through wanton killing or incidental take, and alter natural behaviors, reducing breeding and/or foraging success.

6.1.7 Other (Avg. Score: 2.00)

NJ Specific Threats: 6.1.7.2 Human presence in sensitive areas may introduce wildlife diseases or pathogens into the system.

6.2 Military Exercises

6.2.1 Military exercises (Avg. Score: 2.00)

NJ Specific Threats: 6.2.1.1 Military testing and training exercises may inflict disturbance and potential physical harm to wildlife.

6.2.1.3 Lack of opportunity for non-federal wildlife managers to influence activities on military bases may result in detrimental impacts to SGCN and/or missed opportunities to engage in projects that benefit SGCN.

6.3 Work and Other Activities

6.3.1 Unauthorized research projects at significant habitats (Avg. Score: 2.00)

NJ Specific Threats: 6.3.1.1 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.1.2 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.1.3 Activities conducted without proper precautions may disturb and disrupt normal wildlife behaviors, which may impact reproductive success or survival, cause abandonment of critical sites, etc.

6.3.2 Authorized research projects at significant habitats (Avg. Score: 2.00)

NJ Specific Threats:

6.3.2.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.2.3 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.2.4 Activities conducted without proper precautions may disturb and disrupt normal wildlife behaviors, which may impact reproductive success or survival, cause abandonment of critical sites, etc.

6.3.3 Other "work" unrelated to research (Avg. Score: 1.00)

NJ Specific Threats:

6.3.3.1 Construction projects may disrupt normal wildlife behavior which can result in reduced reproductive success or survival, abandonment of critical sites, etc. (e.g., bridge-nesting birds).

6.3.3.4 Workers may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

7 Natural Systems Modifications

7.1 Fire and Fire Suppression

7.1.1 Increase in Fire Frequency/Intensity (Avg. Score: 2.00)

NJ Specific Threats:

7.1.1.1 Increase in frequency and intensity of wild fires as a result of droughts and heat waves drying out vegetation and litter.

7.1.1.2 Increase in frequency of wild fires as a result of illegal activities.

7.1.1.3 Unnatural fire regimes occurring as a result of military exercises.

7.1.1.4 Lack of diversity in age structure and composition of vegetation due to expansive, frequent fires.

7.1.2 Suppression of Fire Frequency/Intensity (Avg. Score: 2.00)

NJ Specific Threats:

7.1.2.1 Shift in vegetative communities as a result of suppression of natural fires.

7.1.2.2 Lack of diversity in age structure and composition of vegetation due to the suppression of fire.

7.2 Dams and Water Management/Use

7.2.12 Culverts (Avg. Score: 1.00)

NJ Specific Threats:

7.2.12.1 Improper design, placement, installation and maintenance of culverts and other stream crossing structures can impede or prevent the movements of terrestrial organisms and can restrict or limit stream flow, impeding the movement of aquatic organisms along riparian corridors.

7.3 Other Ecosystem Modifications

7.3.2 Inappropriate timing of mowing (Avg. Score: 2.00)

NJ Specific Threats:

7.3.2.1 Increased risk of direct mortality and/or reduced productivity of wildlife, as well as reduced use by migrating species.

7.3.3 Removal of coarse woody debris (streams, forests, scrub-shrub habitats) (Avg. Score: 2.00)

NJ Specific Threats:

7.3.3.2 Decreases habitat and/or corridor suitability due to limited or absent shelter and foraging habitat.

7.3.3.3 Removal of dead trees (snags), large felled logs (i.e., those > 12" dbh), and other downed woody material diminishes nesting, roosting, and sheltering options for wildlife, and increases the ease at which deer can browse regenerating vegetation.

7.3.3.4 Decreases available basking, shelter, and foraging habitats.

7.3.4 Lack of natural disturbance patterns or ecosystem functions due to species loss (Avg. Score: 1.00)

NJ Specific Threats: 7.3.4.5 The lack of forest disturbance minimizes the diversity of herbaceous vegetation and other shrubs and trees that need a lot of sunlight to grow.

7.3.5 Poor habitat management (Avg. Score: 3.00)

NJ Specific Threats: 7.3.5.1 Improper or poorly scheduled maintenance of man-made corridors (e.g., roadsides and medians) can cause direct mortality to and may reduce productivity of wildlife.

7.3.5.3 Vegetation clearing removes terrestrial and riparian corridors for animal movement, shelter, and resting areas.

7.3.5.5 Habitat management that alters or removes vegetation without implementing long-term management increases the risk of invasive and exotic plants establishing themselves, outcompeting native vegetation.

7.3.5.6 Habitat management, including that which occurs on public and private lands, that does not consider timing and species' behaviors can result in the direct mortality and/or alteration or loss of habitat.

7.3.5.7 Improperly planned habitat management and/or mitigation efforts along roadsides and within the medians can attract wildlife and increase the risk of vehicle strikes.

7.3.5.12 Lack of diversity in age structure and composition of vegetation due to lack of natural disturbances and/or vegetation management.

7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.1.1.1 Displace or outcompete native species for resources.

8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.

8.1.1.3 Invasive, non-native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

8.1.1.4 Invasive, non-native animals increase the risk of predation on native animals and/or herbivory on native vegetation.

8.1.1.5 Invasive, non-native animals and plants increase the risk of introduction and transference of diseases

8.1.1.6 Invasive, non-native plants may create physical barriers for some species.

8.1.4 Invasive non-native terrestrial/wetland animals (Avg. Score: 1.00)

NJ Specific Threats: 8.1.4.1 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.4.2 Free-roaming and feral domestic animals such as cats and dogs causes direct mortality of wildlife and disturbance to wildlife breeding and resting areas.

8.1.5 Invasive non-native terrestrial/wetland plants (Avg. Score: 1.00)

NJ Specific Threats: 8.1.5.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.6 Invasive non-native fungal/bacterial diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.1.6.1 The introduction of non-native fungal and bacterial diseases threatens native populations and ecosystems.

8.2 Problematic Native Species/Diseases

8.2.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.2.1.1 Overabundant native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

8.2.1.2 Invasive pathogens and insects may increase in range and abundance as limiting factors (such as temperature) are altered as a result of climate change.

8.2.1.4 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.2.2 Named Species (Avg. Score: 1.00)

NJ Specific Threats: 8.2.2.2 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.4 Problematic Species/Diseases of Unknown Origin

8.4.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.4.1.1 Non-native or poorly understood diseases and parasites could potentially impact native animals.

8.4.2 Named Species (Avg. Score: 2.00)

NJ Specific Threats: 8.4.2.2 Diseases of unknown origin, such as snake fungal disease and Ranavirus, can cause significant mortality among native animal populations.

8.5 Viral/Prion-induced Diseases

8.5.1 Unspecified Species (Disease) (Avg. Score: 1.00)

NJ Specific Threats: 8.5.1.1 There is a large knowledge gap regarding the existence of, or potential for, other diseases impacting native wildlife.

8.5.2 Named Species (Disease) (Avg. Score: 2.00)

NJ Specific Threats: 8.5.2.1 Diseases such as West Nile Virus, arenavirus, sudden oak death, Avian Influenza, and snake fungal disease cause morbidity or mortality to native populations.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.2 Industrial and Military Effluents

9.2.1 Oil Spills (Avg. Score: 1.00)

NJ Specific Threats: 9.2.1.1 Oil spills render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.1.2 Oil spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.1.3 Oil spills cause external oiling of wildlife and ingestion of oil, both of which can injure or kill wildlife.

9.2.3 Other (Avg. Score: 1.00)

NJ Specific Threats: 9.2.3.2 Chemical spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.3.3 Chemical spills may render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.4 Other: Hydrofracturing (Avg. Score: 1.00)

NJ Specific Threats: 9.2.4.2 Uncontrolled effluents escaping from hydrofracturing facilities can cause injury to wildlife and alter normal behaviors.

9.2.5 Other: Industrial toxic settling ponds (Avg. Score: 1.00)

NJ Specific Threats: 9.2.5.1 Surficial or open industrial effluent ponds can cause injury or death to wildlife that become exposed through ingestion or submersion.

9.3 Agricultural and Forestry Effluents

9.3.2 Soil Erosion and Sedimentation (Avg. Score: 1.00)

NJ Specific Threats: 9.3.2.2 Soil erosion and sedimentation limit the re-establishment of plants needed by terrestrial wildlife as cover and a food base.

9.3.3 Herbicides and Pesticides (Avg. Score: 1.00)

NJ Specific Threats: 9.3.3.2 Use of rodenticides can cause secondary actions of injury and death to animals in the course of scavenging.

9.3.3.3 Use of pesticides can directly harm non-target species through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture (Avg. Score: 1.00)

NJ Specific Threats: 9.3.5.1 Use of pesticides, insecticides, and/or herbicides can directly harm non-target species, such as amphibians and beneficial invertebrates through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5.4 Improper use of current insecticides, such as those containing esfenvalerate, prallethrin, or piperonyl butoxide, or past use of pesticides containing chlordane still present in the soils, are toxic to various wildlife species, and can cause injury, mortality, or other effects that impair population viability.

9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.4 Garbage and Solid Waste

9.4.1 Direct hazards to wildlife (Avg. Score: 1.00)

NJ Specific Threats: 9.4.1.1 Wildlife may ingest garbage causing choking or impingement in the digestive system, or they may become physically entangled in it (e.g., plastic or abandoned fish nets); conditions that make them unable to feed or drink, cause them to suffocate or drown, or otherwise restrict the animal's movement making them more susceptible to predators, starvation or injury.

9.4.1.2 Garbage and solid waste destroys natural habitats and obstructs wildlife movements.

9.5 Air-Bourne Pollutants

9.5.6 Herbicides and Pesticides (Avg. Score: 2.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

9.6 Excess Energy

9.6.3 Noise Pollution (Avg. Score: 1.00)

NJ Specific Threats: 9.6.3.1 Acute and chronic noise pollution in and adjacent to terrestrial and aquatic (marine and freshwater) environments could disrupt normal behaviors of wildlife such as migration, communication, feeding, eluding predators, resting and breeding, etc.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 1.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.3 Temperature Extremes

11.3.1 Temperature extremes (Avg. Score: 2.00)

NJ Specific Threats: 11.3.1.4 Extremely low temperatures and/or extensive periods of unseasonably low temperatures during critical life history stages (e.g., hibernation, gestation/nesting) can alter animals' behaviors and decrease survivorship.

11.4 Storms and Flooding

11.4.2 Increased rainfall (Avg. Score: 2.00)

NJ Specific Threats: 11.4.2.2 Extreme rain events can damage wildlife nesting and resting habitats, including impacts to avian eggs and chick and small mammal survivorship.

11.6 Phenology Shifting or Alteration

11.6.2 Phenology shifts related to predator-prey ecology (Avg. Score: 1.00)

NJ Specific Threats: 11.6.2.1 Alters inter-specific relationships (e.g., competition, parasitism, predation) of wildlife, ultimately leads to detrimental impacts on the ecological system.

11.6.2.2 Shifts timing of species migration, breeding and hibernation, and available food resources, causes redistribution of species, or mortality for species that are unable to relocate due to their already isolated habitat or limited mobility.

11.6.3 Phenology shifts related to species redistribution (Avg. Score: 1.00)

NJ Specific Threats: 11.6.3.1 Shifts in timing of species migration, breeding and hibernation, and available food resources, as a result of wildlife range shifts driven by climate change.

11.6.3.2 Shifts in nesting times or egg incubation durations can limit nest success and longterm populations.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 3.00)

NJ Specific Threats: 12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.2 Lack of up-to-date existing information (Avg. Score: 3.00)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.3 Need to answer research question (Avg. Score: 3.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.4 Need to develop new technique (Avg. Score: 2.00)

NJ Specific Threats: 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.

12.1.4.2 Improve and evaluate survey methods for species not easily detected through standard survey methods.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 1.00)

NJ Specific Threats:

12.3.0.1 Regulatory habitat protections within state land use regulations are spatially limited to specific geographic areas (e.g., Pinelands, Coastal Area) or geographic features (e.g., wetlands, streams) and so fail to protect critical habitats that exist outside of these regulated areas.

12.3.0.3 Lack of a licensing program and standards for NJ Nuisance Wildlife Control Operators (NWCOs) leads to inadequate controls over handling of wildlife and lack of reporting of non-game/SGCN species (and all wildlife) encountered in nuisance situations.

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.9 Prescribed burns implemented by the NJ Forest Fire Service are constrained by State air quality regulations to a timeframe where seasonal weather conditions are less than ideal for effective burning. As a result, the Forest Fire Service is limited in the number of overall prescribed burns it can implement to restore habitat for wildlife.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 1.00)

NJ Specific Threats:

12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.

12.4.0.3 Lack of internal understanding regarding beneficial habitat impacts of storm events leads to policies and practices that reverse or decrease such beneficial effects (e.g., beach-filling, shoreline hardening, “hazard” tree and log removal from forests, etc.

12.4.0.5 Bureau of Forest Fire Management policy has traditionally implemented prescribed burns on State lands for the sole purpose of public safety (i.e., addressing hazard fuel reduction), missing opportunities to burn in a manner that would additionally manage habitat for ecological diversity.

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 2.00)

NJ Specific Threats:

14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 2.00)

NJ Specific Threats: 14.2.1.1 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various forest management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 1.00)

NJ Specific Threats: 15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.4 Secure and promote the protection, restoration, and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts through incentive programs.

1.2.1.5 Secure and promote the protection/restoration of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.9 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing Forestry Stewardship Programs.

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.12 Create incentives (non-monetary and/or monetary) for land developers to redevelop abandoned areas (e.g., shopping centers, office complexes) to minimize the loss of natural habitats and reduce the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.18 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and land managers to control and reduce the impacts of invasive, native and non-native species in order to increase structural habitat diversity.

1.2.1.19 Create incentives for federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to farmers, woodland landowners, and private landowners to adopt and/or endorse consistent BMPs concerning controlled burns to maintain and/or improve wildlife habitat.

1.2.1.20 Coordinate across government agencies and non-government organizations to create or expand upon tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMP's.

1.2.1.23 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to provide cost shares and/or plan approvals for management based on management approaches and prescriptions.

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

1.2.1.28 Create incentives to implement dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

2 Direct Management of Natural Resources

2.2 Dam and barrier removal

2.2.1 Culvert work

2.2.1.1 Replace existing barriers to wildlife movement with and/or install appropriately-sized systems to accommodate wildlife dispersal.

2.3 Fire management

2.3.2 Fuel reduction

2.3.2.1 Prevent wildfires by reducing natural fuel (e.g., leaf litter).

2.3.3 Prescribed burning

2.3.3.1 Evaluate different management techniques of prescribed burns that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

2.3.3.2 Conduct prescribed burning in Northern New Jersey forests to maintain and regenerate a mosaic of upland forest habitats.

2.3.3.3 Conduct prescribed burning to improve wildlife habitat.

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.5 Implement biologically safe and appropriate control/management strategies, and where appropriate, eradication strategies to reduce the impacts and/or limit the distribution of invasive and/or non-native plant species within or near aquatic systems using methods that will provide the most protection to the aquatic and riparian ecological system, and minimize disturbance to the soil and wildlife. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.8.0.6 Implement long-term management of invasive and/or non-native plants to help maintain functioning ecological systems and biological diversity, and to enhance travel corridors. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.3 Restore and/or enhance habitats to benefit urban-associated SGCN.

2.10.0.4 Restore and/or enhance suitable travel corridors connecting conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.8 Protect significant natural and/or unique communities by implementing best management practices when conducting habitat restoration strategies.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.12 Create and/or maintain scrub-shrub habitats through revegetation efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.15 Restore and/or enhance terrestrial and aquatic habitats proximate to but not adjacent to roads and other transportation corridors for terrestrial-bound SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.10.0.21 Restore and/or enhance understory habitats that suppress invasive species and provide critical resources and enhance sheltering, foraging, and nesting cover for wildlife.

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.10.0.24 Use NJ's CHANJ mapping and guidance to establish vegetation and enhance or create corridors between fragmented habitats with similar vegetation, slope, soils, structure, etc. to ensure vegetative integrity is maintained to allow wildlife to safely disperse, and corridors are buffered with natural habitats to minimize disturbance to wildlife within the corridors.

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.11.0.3 Create suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats through vegetation management.

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through vegetation management.

2.11.0.6 Reclaim degraded rare species habitats by conducting vegetation management needed to restore habitat value for the documented/target SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.13 Implement best management practices (BMPs), protective strategies, and guidelines for vegetation management to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.11.0.14 Conduct vegetation management adjacent to roads for SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.11.0.16 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.11.0.18 Implement forest management/silvicultural strategies that promote the development of new old-growth forests and/or minimize the loss of old-growth forest stands with large trees and within large, contiguous tracts.

2.11.0.19 Implement forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN.

2.11.0.20 Create and/or maintain scrub-shrub habitats through management efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.11.0.23 Implement appropriate habitat management actions in areas where natural disturbances, such as wildfire, have been precluded.

2.11.0.25 Conduct vegetation management along access roads following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.26 Conduct vegetation management along roadsides and medians, avoiding peak activity periods for wildlife, that enhances wildlife dispersal naturally and safely across roads and similar barriers to/between terrestrial and/or aquatic habitats.

2.11.0.27 Conduct vegetation management for target shrub- or young forest-dependent SGCN following BMPs to minimize the risk of the establishment of invasive and non-native plants.

2.11.0.28 Conduct vegetation management in agricultural areas following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.29 Conduct vegetation management on transportation and service corridors (i.e., rights-of-way) following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.31 In areas where vegetative communities are shifting due to fire suppression and controlled burns are not feasible, manage vegetation to improve wildlife habitat.

2.11.0.32 Increase structural habitat diversity around and when feasible, within agricultural landscapes by managing vegetation for a variety of species, in particular, those farms that have removed scrub-shrub habitat and/or fragmented forests, and by implementing ecologically best practices (e.g., no-till farming, maintaining hedgerows, buffer set-asides, etc.).

2.11.0.33 Increase structural habitat diversity by implementing long-term vegetation management to minimize the potential for the establishment of invasive and/or non-native plants that may outcompete native vegetation.

2.11.0.34 Increase structural habitat diversity by managing residential, commercial and recreational areas' landscapes for a variety of species. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.

2.11.0.37 Increase structural habitat diversity by minimizing the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats which benefits wildlife.

2.11.0.38 Increase structural habitat diversity in and around horse/livestock farms by managing vegetation for a variety of species, in particular, in and around farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

2.11.0.39 Increase structural habitat diversity in and around solar farms by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.40 Increase structural habitat diversity surrounding areas used for energy, mining, and transportation and service corridors by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides, and avoid managing habitat during the breeding seasons for ground-nesting birds, reptiles, amphibians and small mammals.

2.11.0.41 Increase structural habitat diversity through the implementation of a variety of vegetation management practices such a prescribed burns (either increasing or decreasing their frequency depending on the site and objective), plantings, etc. that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.42 Increase structural habitat diversity within wind farms for terrestrial bound and low-flying species and around wind farms for other wildlife by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.43 Manage forests to increase variation in age structure and composition using BMPs that promote and maintain functioning ecological forest-based systems and biological diversity.

2.11.0.45 Regularly and/or rotationally create young forest habitat in targeted areas to maintain and regenerate a mosaic of upland forest habitats that will benefit shrub- and young forest-dependent species.

2.13 Wildlife damage management

2.13.0 Nuisance fish and wildlife damage

2.13.0.5 Investigate the impacts of human-subsidized and/or naturally occurring predator species on SGCN to assess the need for integrated wildlife damage management techniques (e.g., predator exclosures, fish blockages, electric fence, culls) and/or policy changes on state land management that minimize the impacts of human-subsidized predators.

2.13.0.8 Implement and assess management strategies to control and reduce the impacts of detrimental species and diseases that pose threats to native wildlife or communities.

2.14 Wildlife disease management

2.14.0 Wildlife disease strategy development and investigation

2.14.0.1 Investigate diseases/pathogens impacting SGCN and/or their habitats.

2.14.0.2 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

2.14.0.4 Conduct long-term monitoring of diseases in vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts.

2.14.0.5 Assess the impacts of diseases on the life cycles of wildlife.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.6 Conduct long-term studies on resident and migratory SGCN to determine if there are changes to the populations' demography (productivity, survival, dispersal) and/or to their critical and/or supporting habitats (i.e., diminishing in value, acreage or connectivity, etc.), in particular changes that would not maintain SGCN at viable levels for species populations. Update data and GIS maps; provide updated information to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.11 Develop, implement and evaluate the effectiveness of town plans that avoid impacts to SGCN species and their habitats.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.19 Identify the presence and status (e.g., functioning, structure, slated for removal, etc.) of existing dams and culverts within and/or that may impact SGCN and their habitats, and create a database that includes a GIS component identifying the locations of such structures and their status. Share this information with appropriate organizations and/or agencies evaluating the benefits and risks of such structures on SGCN and their habitats.

3.0.0.20 Once baseline data identifying and describing the status of existing dams and culverts have been gathered, conduct evaluations at a variety of sites to determine whether the benefits of culvert and dam creation or removal outweigh the risks to SGCN species and their habitats, and if other variables/conditions specific to individual sites/locations result in a different outcome. Identify and target appropriate dams and culverts for removal and/or reconstruction to minimize harm to SGCN species and their habitats.

3.0.0.26 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species including objectives and guidance pertaining to and the condition/status of critical and supporting habitats.

3.0.0.27 Evaluate the effectiveness of strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals through research and monitoring. Develop and provide NJ DEP and other appropriate governing agencies/commissions a summary of findings and recommendations to improve such efforts.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.4 Conduct long-term monitoring of the impacts of contaminants to vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.2.0.5 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

3.2.0.6 Develop, implement and conduct studies to evaluate the effectiveness of methods implemented to reduce road mortality of wildlife (e.g. wildlife underpasses, road closures).

3.2.0.7 Track (via a database that includes a GIS component) and research problematic species and diseases to determine their distribution, impacts on SGCN wildlife/wildlife communities, and develop potential control measures.

3.2.0.8 Implement and conduct long-term monitoring of control measures aimed at minimizing the impacts of problematic species and/or diseases to evaluate the effectiveness of such efforts and to identify and incorporate additional strategies as appropriate.

3.2.0.10 Evaluate the effectiveness of sanitation/decontamination protocols in minimizing the transference of wildlife diseases and invasive plant species.

3.2.0.12 Investigate the impacts of ORV use and ORV-created noise on terrestrial and aquatic wildlife behavior and the impact of direct mortality from vehicle strikes. Integrate this information when mapping undeveloped roads and trails to identify potentially sensitive areas in northern NJ forests.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.2 Age, size and sex structure

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.3 Baseline inventory

3.2.3.6 Investigate the feasibility and potential for success of conducting genetic rescue through translocation and/or reintroduction of animals into suitable habitat that was historically occupied to increase genetic diversity and reconnect isolated populations. Methods of investigation should include, but are not limited to, thorough literature reviews, expert opinions, identifying potential pitfalls (e.g., species' fidelity to their range or critical areas), and an examination of historic and current SGCN population distribution and suitable habitat availability.

3.2.3.7 Identify roads or portions of roads, paved or unimproved (through site surveys, land use/land cover assessments and analyses, review of available data, enlistment of species experts, etc.) with high incidences of road mortality and/or presence of snakes, turtles, medium-sized and large mammals. Conduct assessments of the roads and incorporate information into a database that includes descriptions (e.g., qualifiers to help prioritize the roads' risk to wildlife) and a GIS component of the locations of such areas. Share this information with appropriate organizations and/or agencies working to implement measures (e.g., wildlife passages, road closures) to minimize the risk to these species.

3.2.4 Food habits

3.2.4.1 Monitor and investigate the populations and health of SGCN prey/food resources for those SGCN whose populations are thought to be limited due wholly or in part to a lack of food resources or toxins in food resources.

3.2.5 Genetics

3.2.5.1 Investigate the feasibility and potential for success of conducting genetic rescue through translocation and/or reintroduction of animals into suitable habitat that was historically occupied to increase genetic diversity and reconnect isolated populations. Methods of investigation should include, but are not limited to, thorough literature reviews, expert opinions, identifying potential pitfalls (e.g., species' fidelity to their range or critical areas), and an examination of historic and current SGCN population distribution and suitable habitat availability.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.6 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) that could, through revegetation and/or enhancement efforts, become suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN.

3.3.1.7 Map and prioritize existing and potential areas for early succession forest management. Share the results with state, county and municipal planners.

3.3.1.8 Assess the availability and suitability of forest habitats for SGCN species (particularly reptiles and amphibians, birds, pollinators, and tiger beetles) in southern forests since Superstorm Sandy.

3.3.1.9 Inventory forests throughout northern New Jersey to develop a baseline characterization of the structure and composition of habitats and identify deficient forest habitat types.

3.3.1.16 Gather "best information" for spatial modeling and update/create a current model/depiction of anticipated habitat shifts from sea-level rise, flooding, etc.

3.3.1.17 Identify and map undeveloped roads and trails in all conserved forests, and create a database of locations. Integrate information regarding potentially sensitive areas.

3.3.1.18 Conduct an assessment using available data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels.

3.3.1.19 Identify and codify legal ORV access areas on state (and if appropriate, other conserved) lands. Provide GIS mapping to the landowner for potential use in directing such recreational activities.

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.2 Monitoring

3.3.2.1 Evaluate the effectiveness of forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.8 Evaluate the effectiveness of current prescribed burning practices on Pinelands dependent species.

3.3.2.9 Investigate the effectiveness of various silviculture techniques for enhancing forests for forest-dependent SGCN.

3.3.2.10 Evaluate the efficacy and success of different management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.3.2.15 Investigate the effectiveness of management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.3.2.20 Once a system is developed for reporting and qualifying new locations of invasive species, develop, implement and monitor/evaluate invasive species removal strategies at identified locations. Priority should be given to those areas critical to SGCN and/or contain unique and/or rare plant communities supporting SGCN and/or other fish/wildlife species.

3.3.2.24 Conduct regular inventories of forests throughout northern New Jersey to characterize the changing structure and composition of habitats and monitor forest conditions.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.3 Develop/improve management techniques that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.7 Develop/improve forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

3.5.3.8 Develop best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5.3.9 Develop strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.14 Develop aquaculture practices in the coastal areas that are compatible with the recovery of SGCN.

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.3.16 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.3.19 Work with foresters to develop prescribed burning practices for Pinelands dependent species that increase or maintain habitat quality for these species in the Pinelands.

3.5.3.20 Develop guidance on various silviculture techniques for enhancing forests for forest-dependent SGCN.

3.5.3.21 Develop management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.24 Based on research, modify management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.1 Develop studies to evaluate management strategies to improve the availability of prey/food resources for SGCN whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources. Monitor and investigate the management strategies over time to determine success and/or the need to revise methods.

3.5.4.5 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

3.5.4.6 Investigate the feasibility of mitigating for the impacts of contaminants to vulnerable wildlife, particularly SGCN. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.5.4.7 Investigate the feasibility and potential for success of conducting genetic rescue through translocation and/or reintroduction of animals into suitable habitat that was historically occupied to increase genetic diversity and reconnect isolated populations. Methods of investigation should include, but are not limited to, thorough literature reviews, expert opinions, identifying potential pitfalls (e.g., species' fidelity to their range or critical areas), and an examination of historic and current SGCN population distribution and suitable habitat availability.

3.5.4.9 Conduct studies to evaluate the impacts of roads on SGCN and develop, implement and conduct studies to evaluate the effectiveness of methods to reduce road mortality of wildlife (e.g. wildlife underpasses, road closures).

3.5.4.13 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.4.14 Develop and implement agreements, and update existing agreements, with government agencies regarding the protection of critical SGCN habitats (e.g., significant breeding populations of beach nesting birds, colonial waterbird nesting areas, bat colonies, etc.).

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.17 Investigate new, non-invasive techniques for SGCN population evaluation through literature review, expert opinion, trial studies (if low risk), etc.

3.5.4.18 Investigate the effectiveness of survey techniques through selected "ground truthing" and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

3.5.4.21 Develop BMPs to address problematic species and diseases of unknown origin.

3.5.4.22 Investigate the efficacy of implementing strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities.

4 Education

4.1 Educator/Instructor training

4.1.0 Public education

4.1.0.1 Provide educational resources and training programs to private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

5 Facilities and Areas

5.15 Wildlife Management Areas

5.15.6 Roads

5.15.6.2 Clearly post areas/trails where vehicle access is not permitted.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.1 Enhance and increase the effective size of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates by securing adjacent habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.6 Secure and protect old-growth forest stands with large trees and/or stands that are approaching or being actively managed for old growth forests, in particular those within large, contiguous forest tracts, through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.7 Secure and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.8 Secure and protect scrub-shrub habitats for SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.1 Promote the protection of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates and enhance these lands by increasing the effective size through conservation area designations of stopover habitats and adjacent private lands.

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.6 Promote the protection of old-growth forest stands with large trees and/or stands that are approaching or being actively managed for old growth forests, in particular those within large, contiguous forest tracts, through conservation area designations.

6.3.0.7 Promote the protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through conservation area designations.

6.3.0.8 Promote the protection of scrub-shrub habitats for SGCN through conservation area designations.

6.4 Private lands agreements

6.4.0 Private land agreement strategies

6.4.0.1 Enter into private lands agreements to expand control burns on private lands, in particular those adjacent to conserved lands to improve SGCN habitats.

7 Law Enforcement

7.1 Law enforcement

7.1.3 Sub-national Level

7.1.3.2 Increase the number of law enforcement officers tending to wildlife issues to a reasonable number to sufficiently cover the State and marine waters.

7.1.4 Scale Unspecified

7.1.4.3 Increase law enforcement presence proximate to sensitive areas [e.g., avian nesting sites, in particular rookeries, and reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively)] to deter human activity and subsequent disturbance to SGCN.

7.1.4.6 Recruit law enforcement to assist in the protection and enhancement of SGCN populations, in particular endangered species, through improved awareness of species through trainings, partnerships, and other methods. Information should include but is not limited to: 1) Issues concerning illegal collection of reptiles, 2) Persecution of rare snakes, 3) Illegal recreational activities on public lands (e.g., off-road vehicles) and their impact on wildlife, 4) Identification of sensitive areas, critical sites and/or "hot-spots" for collection.

7.1.4.7 Increase law enforcement presence to enforce regulations governing recreational activities (e.g., the use of personal watercraft and off road vehicles, caving, rock climbing, etc.) on conserved lands and within other sensitive habitats, and discourage activities that cause harm or disturbance to vegetation, wetlands, fish and wildlife.

7.1.4.9 Implement policies that improve and secure habitat connections between conserved SGCN habitats.

7.1.4.10 Implement policies that promotes expanding acreages and enhances the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.14 Implement policies that protect existing and developing old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

7.1.4.15 Implement policies that preserve and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

7.1.4.19 Implement policies that protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

7.1.4.22 Implement policies and/or regulations that prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

7.1.4.23 Implement policies that minimize wildlife road mortality.

7.1.4.25 Encourage the enforcement of municipal laws regulating domestic pets that may predate on wildlife.

7.1.4.26 Educate law enforcement personnel that there may be unauthorized research projects taking place and to encourage them to investigate any activities that appear to be harmful to wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.1.0.4 Engage government agencies, conservation partners and other stakeholders in constructive dialogues encouraging them to influence policy change and the creation of incentives through a habitat bill and/or municipal ordinances for backyard habitat.

8.1.0.11 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting sportsmen's organizations and fisheries, as well as public constituents, addressing the unintended effects abandoned fishing gear, tackle and crab pots can have on wildlife, and promote the collection and/or reporting of abandoned items and their locations.

8.1.0.13 Engage DOD in a constructive dialogue regarding strategies to minimize disturbances to all SGCN (i.e., beyond their federal requirements) from forest management and other practices on their lands.

8.1.0.14 Engage DOD in a constructive dialogue regarding strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities.

8.1.0.15 Engage government agencies, conservation partners and other stakeholders in discussions encouraging and supporting the creation of laws and policies requiring vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

8.1.0.16 Engage local governments in discussions regarding the importance of them adopting/passing ordinances which require assessing and addressing secondary impacts (i.e., ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

8.1.0.17 Engage municipalities in constructive dialogue to identify and minimize destruction of areas prioritized for early succession forest management.

8.1.0.18 Engage NJDOT, NJ Transit Authority and other road management entities, wildlife conservation organizations/agencies (e.g., Division of Fish and Wildlife, New Jersey Conservation Foundation, Conserve Wildlife Foundation of NJ), and communities and citizens in discussions regarding the importance of and methods to enhance habitat connectivity, and work together to develop feasible strategies for ensuring that wildlife can disperse naturally and safely across roads and similar barriers to terrestrial and/or aquatic habitats.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.21 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation human-subsidized and/or overabundant, native species cause to local nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.26 Coordinate across federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to woodland landowners to adopt or endorse consistent best management practices concerning controlled burns to maintain and/or improve forested habitat for wildlife.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.34 Work with the NJ Education Association and Department of Education to design curriculum and outdoor experimental learning opportunities, and provide training to teachers on implementation of these activities.

8.1.0.37 Enlist landowners and NJ citizens in the protection of and survey efforts for SGCN, in particular rare species, by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management and wildlife-related volunteer programs.

8.1.0.38 Engage partners, stakeholders and land managers in constructive dialogue promoting forest stewardship for SGCN that use core forests and forested corridors.

8.1.0.40 Encourage researchers, land managers, naturalists and enthusiasts to follow proper procedures for the coordination and/or permitting of research/management activities involving wildlife and sensitive habitats, and discourage activities that alter vegetation or wetlands, or cause harm or disturbance to wildlife.

8.1.0.42 Engage citizens, wildlife observers and photographers through discussions and distributable information regarding the importance of and encouraging implementing responsible and ethical behavior when observing wildlife by developing an alliance of wildlife photographers and widely circulating recommendations on how to reduce impact.

8.1.0.44 Engage conservation partners, stakeholders, government agencies and other land stewards in constructive dialogues encouraging their inclusion of controlled burns in forest and other stewardship plans.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.6 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners, land managers and local communities to discourage the presence of managed cat colonies and trap, neuter and release programs in wildlife habitats.

8.3.0.7 Develop and provide (or otherwise make publicly available) educational programs and/or materials that describe the negative impacts of off-road vehicles and watercraft use in and adjacent to critical SGCN habitats, and the importance of confining such activities to more appropriate locations and/or seasons.

8.3.0.8 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate recreationists and encourage landowners to eliminate garbage in the vicinity of suitable wildlife habitat, in particular SGCN habitat. Information should include the detrimental impacts garbage may have on various wildlife species.

8.3.0.9 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners and land managers to include only native plants in landscaping and restoration projects. Provide information to assist them in detecting problematic establishment of invasive, non-indigenous plants.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.11 Develop and provide (or otherwise make publicly available) educational programs and/or materials to the public, wildlife-related professionals, foresters, etc., that describe the value of species that are often feared (e.g., snakes, bats, spiders, Allegheny woodrat) and/or deemed a "nuisance" (e.g., squirrel, deer, snapping turtle), and therefore, persecuted by people. Include information on tolerance, proper identification, eviction from human dwellings, how to minimize the animal's presence on the property, and/or how to live in harmony with the animal.

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.19 Develop an educational outreach program for the public on the devastating effects predators can have on native nesting wildlife.

8.3.0.24 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

8.3.0.26 Develop educational outreach programs for private and public landowners and land managers regarding the importance of and how to manage core forests and forested corridors in a way that will be beneficial for SGCN, particularly endangered, threatened and special concern species.

8.3.0.27 Develop educational outreach programs for public and private landowners and land managers regarding the importance of structural habitat diversity, methods to increase diversity, and/or incentive programs available to increase habitat diversity.

8.3.0.30 Develop educational outreach programs for private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

8.3.0.31 Develop an educational outreach program for landowners and citizens on the secondary impacts of rodenticides on predators and scavengers.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.5 Develop a plan that directs the creation or expansion of energy or utility rights-of-way in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.6 Develop a plan that directs the creation or expansion of roads and railroads or the re-establishment of abandoned railroads within and adjacent to critical forested habitats in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.8 Develop a plan that focuses on strategies for oil pipelines to avoid sensitive habitats that would be highly impacted by oil spills.

9.1.0.9 Develop a plan that focuses on strategies to minimize the creation of renewable energy farms (e.g., solar, wind) and related infrastructures within and their impacts on forested habitats and the wildlife community.

9.1.0.10 Develop a plan that focuses on strategies to minimize the impacts of mining on critical forested habitats.

9.1.0.11 Develop a plan that focuses on strategies to minimize the impacts of power plants on critical forested habitats and the wildlife community.

9.1.0.15 Develop a plan to minimize fragmentation of terrestrial and aquatic habitats by roads.

9.1.0.16 Develop a plan to minimize new lawnscapes and preserve natural vegetation within and adjacent to critical forest areas.

9.1.0.18 Develop a plan to minimize the effects of road widening and traffic volume increases within critical wildlife habitat areas using CHANJ products.

9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

9.1.0.20 Develop a plan to minimize the impacts of existing agricultural properties adjacent to and the conversion of forest habitats (terrestrial and aquatic, within or adjacent to critical forests) to agriculture, grazing areas/livestock farms, and plantations.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.23 Develop a plan to mitigate the effects of transportation barriers by using CHANJ products.

9.1.0.27 Develop a plan to use wildlife-appropriate culverts in critical forested areas.

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.2 Organizational strategic and CMS planning

9.2.1 Organizational strategic and operational planning

9.2.1.1 Identify and codify legal ORV access areas on state lands.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.7 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.10 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.14 Create species management plans that will promote the protection and where appropriate, the development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

9.3.1.16 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.2 Listed species recovery planning

9.3.2.1 Develop proactive species recovery plans for all endangered and threatened species including guidance and objectives pertaining to critical and supporting habitat to meet and maintain recovery goals.

9.3.3 Habitat management planning

9.3.3.5 Develop a management plan using forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

9.3.3.6 Develop a management plan for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

9.3.3.7 Develop a management plan to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

9.3.3.8 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.3.13 Develop a management plan that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas and prevents or ameliorates near-term impacts of climate change throughout the State, but in particular within the coastal and Delaware Bay areas.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.16 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.3.17 Develop a management plan for prescribed burning that will benefit Pinelands dependent species and increase or maintain habitat quality for these species in the Pinelands.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.21 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.3.22 Create management plans to minimize and/or prevent wildlife road mortality that will incorporate wildlife passages in conjunction with barrier fencing and, where possible, seasonal closures. Aquatic-associated passages must avoid disturbance to the natural streambeds and riparian habitat, permit high volumes of water to flow freely, and provide adequate travel corridors for terrestrial wildlife, while maintaining stream flow for fish passage. Bridges that span rivers and streambeds and include floodplain habitat on either side of the span to provide travel corridors for terrestrial wildlife are preferred over culverts.

9.3.3.23 Create forest management plans that will promote the protection and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

9.3.3.29 Develop habitat management plans aimed at reducing or eliminating negative impacts of ORVs.

9.3.3.32 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3.34 Include controlled burn prescriptions in forest and stewardship plans to improve wildlife habitat.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.10 Use CHANJ mapping in reviews of proposed energy, mining, transportation and utility service companies/agencies' projects to attempt to maintain habitat connectivity and reduce fragmentation, and identify potential impacts of the projects.

11.1.1.12 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed solar farm projects to reduce habitat fragmentation and minimize impacts on wildlife.

11.1.1.13 Use the best available science (species data, habitat present, wind farm layout options, wind blade impacts on migratory species, location of migration routes, etc.) when conducting regulatory reviews of proposed wind farm projects to minimize impacts on migratory and resident wildlife and reduce habitat fragmentation.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.2 Provide technical support to public and private landowners and land managers for controlling invasive, native and non-native plant species in order to increase structural habitat diversity.

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.4 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the secondary impacts of rodenticides on predators and scavengers.

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.7 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on the importance of maintaining habitat connectivity, minimizing fragmentation, and the use of CHANJ products to help them target areas for such planning.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.11 Provide educational resources, training programs, and on-the-ground guidance to private and public landowners and land managers on the benefits of and for creating young forest and early succession habitat for SGCN.

11.2.0.13 Provide educational resources and technical support to public landowners, private landowners with sufficient acreage, and land managers to promote the protection and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

11.2.0.16 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

11.2.0.19 Provide educational resources and technical support to public and private landowners and land managers to promote the protection and/or enhancement of scrub-shrub habitats for SGCN.

11.2.0.21 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates to promote the protection and/or enhancement of those adjacent habitats to increase the effective size of the migratory habitat.

11.2.0.22 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

11.2.0.23 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to SGCN habitats to promote the protection and/or enhancement of those adjacent habitats to increase the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and that connect conserved SGCN habitats.

11.2.0.24 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers on how to manage vegetated roadside areas (e.g., mowing, brush-hogging, etc.) on a schedule that avoids peak activity periods for wildlife and therefore, minimizes harm.

11.2.0.25 Provide educational resources, training programs, and on-the-ground guidance to resource managers regarding the assessment of and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) related to residential and commercial development.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.0.29 Provide educational resources, training programs, and on-the-ground guidance to Nuisance Wildlife Control Operators (NWCOs), conservation partners, and the public in conserving snake populations by advising proper removal from buildings, exclusion methods from buildings, and improving the public's understanding and acceptance of snakes.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.1 Engage partners and stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.3 Provide educational resources, training programs, and on-the-ground guidance to DOD to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop and implement forest management and other practices that minimize disturbances to SGCN (i.e., beyond their federal requirements).

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

11.2.2 With private landowners

11.2.2.1 Provide technical support to farming operations and woodland landowners on ways to decrease clean farming (edge-to-edge) practices and create ecotones to benefit bobwhite and other species dependent on early successional habitat.

100 Law and Policy

100. Legislation

100.1.3 Sub-national Level

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.4 County and Local

100.1.4.1 Enhance critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates through the local ordinances of adjacent private lands to increase the effective size of the habitat.

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.3 Expand the acreages and enhance the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN through local ordinances.

100.1.4.9 Secure existing and developing old-growth forest stands with large trees, in particular those within large, contiguous forest tracts, through local ordinances.

100.1.4.10 Secure critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through local ordinances.

100.1.4.12 Secure scrub-shrub habitats for SGCN through local ordinances.

100.1.4.13 Encourage municipal laws regulating domestic pets that may predate on wildlife.

100.1.4.14 Adopt/pass local ordinances which require assessing and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.3 Develop policies that will promote the long term protection of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates.

100.3.0.5 Develop policies that will promote improved and secure habitat connections between conserved SGCN habitats.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.11 Develop policies that will ensure the protection and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

100.3.0.12 Develop policies that promote the preservation and protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.15 Develop policies that promote protecting and restoring scrub-shrub habitats to benefit shrub-dependent SGCN.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.20 Develop policies and/or regulations that prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

100.3.0.21 Develop policies that minimize wildlife road mortality through: 1) Requiring the integration of wildlife passages into all new and repaired roads, in particular those areas that will connect SGCN habitats, 2) Requiring current fish/wildlife passages be improved and maintained in perpetuity, 3) Supporting seasonal road closures, in particular for unimproved roads, 4) Supporting projects that work to improve connectivity of SGCN habitats such as land conservation through acquisition or other means.

100.3.0.31 Create or expand tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMPs.

100.3.0.32 Coordinate regulations across agencies to maximize availability of and enrollment in existing Forestry Stewardship Programs (e.g., "Woodland Stewards", Farm Bill, partners, etc.) to maintain and/or improve forest habitat.

100.3.0.36 Create legislation to limit the amount of plastic from shopping bags in circulation and re-instate incentives for citizens bringing their own shopping bag to grocery store.

100.3.0.40 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.45 Increase the controlled burn season to focus on restoring vegetative communities.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.48 Propose new State law or regulation mandating that a State-level "development impact fee" be assessed on all new development approved by municipalities (via the Municipal Land Use Law processes), and dedicate such monies to the development and implementation of regional Habitat Conservation Plans (or existing plans/programs serving the same regional function).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.53 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded rights-of-way corridors associated with energy transport/transmission.

100.3.0.54 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded surface mining areas.

100.3.0.57 Develop regulations that when implemented will improve and secure habitat connections between conserved SGCN habitats.

100.3.0.58 Develop regulations that when implemented will promote the expansion of acreages and enhancement of the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.62 Develop regulations that when implemented will protect existing old-growth forest stands with large trees and/or stands that are being actively managed for old growth forests, in particular those within large, contiguous forest tracts.

100.3.0.63 Develop regulations that when implemented will preserve and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.65 Develop regulations that when implemented will protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

100.3.0.68 Develop regulations that when implemented will prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

100.3.0.69 Develop regulations that when implemented will minimize wildlife road mortality.

100.3.0.71 Develop regulations for licensing, permitting, or certification of Nuisance Wildlife Control Operators (NWCOs) that handle removal/exclusion of protected wildlife, such as bats and snakes, to ensure that proper methods are followed and that occurrences are reported.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100.3.0.73 Develop regulations that would exempt the conversion of lawns to native vegetation (beneficial to wildlife) from local lawn ordinances.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.2 Create a policy that requires the NJ DEP to incorporate scientific information regarding climate change and sea level rise (e.g., predictions, habitat management/acquisition efforts to enhance resilience to inundation) on their websites and to work with other government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

100.4.0.3 Develop policies for mandatory buffer strips on preserved farmlands and state-owned agricultural lands.

100.4.0.4 Create a policy that requires the use of wildlife habitat and corridor mapping products for both regulatory use when conducting project reviews and planning/siting new or expanded rights-of-way projects.

100.4.0.8 Develop a white paper addressing the impacts that existing, new or expanded rights-of-way have upon wildlife, wildlife habitats and habitat connectivity.

100.4.0.9 Develop and implement policies to minimize the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats in order to benefit wildlife.

100.4.0.12 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.4.0.13 Develop policies for different circumstances (e.g., roadsides and medians, riparian, aquatic and terrestrial habitats) that outline appropriate habitat/vegetation management strategies and schedules to minimize risks to and benefit wildlife.

100.4.0.16 Develop policies to implement habitat management strategies that will increase the structural diversity surrounding areas used for energy, mining, and transportation and service corridors which include but are not limited to the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-

100.4.0.17 Develop policies to implement habitat management strategies, including prescribed burns, that will increase the structural diversity on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies to control and reduce the impacts of invasive, non-native species in order to increase structural habitat diversity.

100.4.0.18 Develop policies to minimize the extent of infrastructure associated with energy and service corridors or areas (e.g., wind and solar farms, pipelines, utility lines) and that require the implementation of habitat management strategies that will increase the structural diversity in the area including (e.g., the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides).

100.4.0.19 Develop regulations that will minimize the creation of new barriers, remove or replace current barriers with appropriately-sized systems to accommodate wildlife dispersal, and to minimize road widening and traffic volume increases within critical wildlife habitat areas.

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Northern Diamondback Terrapin

Focal species that comprise this Conservation Target:

Northern Diamondback Terrapin

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:
- 1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.1.1.2 Loss, alteration and/or degradation of habitat.
- 1.1.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.
- 1.1.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:
- 1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.2.1.2 Loss, alteration and/or degradation of habitat.
- 1.2.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.
- 1.2.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:
- 1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.3.1.2 Loss, alteration and/or degradation of habitat.
- 1.3.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture (Avg. Score: 1.00)

NJ Specific Threats:
- 2.1.1.2 Conversion, and subsequent loss, of high salt marsh to low salt marsh threatens high-marsh dependent species and those dependent on the marsh-upland ecotone.
- 2.1.1.4 Salt hay farming on Delaware Bay marshes, and the subsequent conversion of those farms to fully tidal marshes, results in compressed sediments that are less resilient to coastal forces of erosion and sea level rise.

2.4 Marine and Freshwater Aquaculture

2.4.1 Subsistence/Artisinal Aquaculture (Avg. Score: 2.00)

NJ Specific Threats:
2.4.1.1 May degrade freshwater and intertidal habitat due to farming techniques and damage from associated structures.
2.4.1.2 Increased risk of parasite introduction into marine environments.

2.4.2 Industrial Aquaculture (Avg. Score: 2.00)

NJ Specific Threats:
2.4.2.1 May degrade freshwater and intertidal habitat due to farming techniques and damage from associated structures.
2.4.2.2 Increased risk of parasite introduction into marine environments.
2.4.2.3 Potential for increased nutrient and effluent loads.

3 Energy Production and Mining

3.1 Oil and Gas Facilities and Pipelines

3.1.1 Distribution processes of petroleum and other liquid hydrocarbons (Avg. Score: 2.00)

NJ Specific Threats:
3.1.1.1 Fragments terrestrial and aquatic habitats.
3.1.1.2 Loss, alteration and/or degradation of habitat.
3.1.1.3 Increased risk of oil spills.
3.1.1.4 Increased noise pollution.
3.1.1.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.
3.1.1.6 Increased risk of collision between marine mammals, sea turtles and fish and the marine-based structures/facilities.

3.1.2 Natural gas distribution processes (Avg. Score: 1.00)

NJ Specific Threats:
3.1.2.1 Fragments terrestrial and aquatic habitats.
3.1.2.2 Loss, alteration and/or degradation of habitat.
3.1.2.3 Increased risk of gas leaks and explosions.
3.1.2.4 Increased noise pollution.
3.1.2.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.
3.1.2.6 Increased risk of collision between marine mammals, sea turtles and fish and the marine-based structures/facilities.

3.4 Conventional Power Plants

3.4.0 Conventional Power Plants (Avg. Score: 2.00)

NJ Specific Threats:
3.4.0.2 Loss, alteration and/or degradation of habitat due to new or the expansion of current facilities.
3.4.0.3 Alteration of the temperature, pH and/or hydrology of aquatic ecosystems change plant communities and can harm wildlife and/or impact their behavior and survivorship.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:
4.1.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species and inhibiting dispersal of non-volant animals, reducing gene flow.
4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.1.2 Movement of cars and other vehicles on roads and railroads (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats: 4.1.2.1 Increased vehicle traffic increases the risk of wildlife mortality from strikes.

4.3 Shipping Lanes

4.3.1 Movement of large ships in shipping lanes (Avg. Score: 2.00)

NJ Specific Threats: 4.3.1.1 Increased ship traffic increases the risk of wildlife mortality from strikes.

4.3.1.2 May disturb nesting and foraging of shoreline birds and aquatic animals, and/or alter migratory patterns of aquatic and marine wildlife.

4.3.2 Dredging impacts (Avg. Score: 2.00)

NJ Specific Threats: 4.3.2.1 Threatens wildlife by disrupting/removing stream bottom habitat.

4.3.2.3 Transportation of materials to and from disposal facilities may pose temporary disturbance to wildlife impacting foraging and nesting success.

5 Biological Resource Use

5.1 Hunting and Collecting Terrestrial Animals

5.1.1 Intentional Use (Avg. Score: 1.00)

NJ Specific Threats: 5.1.1.1 Illegal collection of wildlife can have detrimental impacts on populations.

5.1.2 Unintentional effects (Avg. Score: 1.00)

NJ Specific Threats: 5.1.2.2 Disruption of normal wildlife behavior.

5.2 Gathering Terrestrial Plants

5.2.2 Unintentional effects (Avg. Score: 1.00)

NJ Specific Threats: 5.2.2.1 Stepping on nests or young/hatchling animals.

5.4 Fishing and Harvesting of Aquatic Resources

5.4.3 Unintentional effects (subsistence/small scale) (Avg. Score: 3.00)

NJ Specific Threats: 5.4.3.1 Abandoned fishing tackle and gear, crab pots without excluders and ghost crab pots increase the risk of injury and death to marine mammals, sea turtles, sea birds, pinnipeds and fish species as well as terrestrial and semi-aquatic species as a result of consuming tackle or gear, entrapment and entanglement in gear.

5.4.3.2 Commercial/recreational shellfish dredging may impact marine ecosystems by uprooting submerged aquatic vegetation, disrupting substrates, increasing turbidity, and increasing predator species in localized areas.

5.4.3.5 Trawling disrupts habitat and threatens marine species including benthic/bottom feeding fishes, invertebrates and other benthic organisms as it disrupts and homogenizes the substratum, can lead to species decline and reduced species diversity.

5.4.3.6 Fishing gear used by commercial fisheries results in bycatch or entanglement of non-targeted wildlife leading to injury and/or mortality.

5.4.3.7 Improperly sanitized equipment, relocation of fish, importation and release of non-native species, and the use of bait from a different location can spread invasive species and diseases from one waterbody to another.

5.4.3.8 Lead in fishing tackle is consumed by wildlife in the course of foraging and scavenging, causing injury and death.

5.4.4 Unintentional effects (large scale) (Avg. Score: 3.00)

NJ Specific Threats: 5.4.4.2 Commercial/recreational shellfish dredging may impact marine ecosystems by uprooting submerged aquatic vegetation, disrupting substrates, increasing turbidity, and increasing predator species in localized areas.

5.4.4.4 Trawling disrupts habitat and threatens marine species including benthic/bottom feeding fishes, invertebrates and other benthic organisms as it disrupts and homogenizes the substratum, can lead to species decline and reduced species diversity.

5.4.4.5 Fishing gear used by commercial fisheries results in bycatch or entanglement of non-targeted wildlife leading to injury and/or mortality.

5.4.4.6 Overexploitation of riparian, estuarine, and marine fisheries may deplete food resources required by marine mammals, sea turtles, marine fish and piscivorous birds, in turn resulting lower reproduction and survival.

5.4.4.7 Improperly sanitized equipment, relocation of fish, use of bait from a different location, can spread invasive species and diseases from one waterbody to another.

5.4.5 Persecution/Control (Avg. Score: 1.00)

NJ Specific Threats: 5.4.5.1 Perception of diamondback terrapin as "bait stealers" may lead to harming/killing or relocation of individuals by recreational and/or commercial crabbers.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized) (Avg. Score: 3.00)

NJ Specific Threats: 6.1.1.1 Inappropriate use of off-road vehicles creates new roads/trails which fragments habitat.

6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.

6.1.1.3 Increased risk of harassment that results in a change in wildlife behavior and/or direct mortality from vehicle strikes.

6.1.1.6 Off-road vehicles can be a mechanism of transference of wildlife diseases and invasive plant species if gear and apparel are not properly sanitized between sites.

6.1.2 Boating (Avg. Score: 2.00)

NJ Specific Threats: 6.1.2.1 Alteration and/or degradation of aquatic habitat.

6.1.2.2 Increased disturbance to marine animals and ocean-, bay- and marsh-associated birds which can alter their behavior decreasing the likelihood of their success and/or reproduction.

6.1.2.3 Motorized boat propellers can inflict physical harm aquatic wildlife species.

6.1.2.5 Watercraft can be a mechanism of transference of wildlife diseases and invasive plant species if gear is not properly sanitized between sites.

6.1.5 Wildlife observation and photography (Avg. Score: 1.00)

NJ Specific Threats: 6.1.5.1 Improperly conducted recreational activities may disrupt normal wildlife behaviors which can result in reduced reproductive success or survival, abandonment of critical sites, etc.

6.1.5.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3 Work and Other Activities

6.3.1 Unauthorized research projects at significant habitats (Avg. Score: 1.00)

NJ Specific Threats: 6.3.1.1 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.1.2 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.2 Authorized research projects at significant habitats (Avg. Score: 1.00)

NJ Specific Threats: 6.3.2.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.2.3 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.3 Other "work" unrelated to research (Avg. Score: 1.00)

NJ Specific Threats: 6.3.3.1 Construction projects may disrupt normal wildlife behavior which can result in reduced reproductive success or survival, abandonment of critical sites, etc. (e.g., bridge-nesting birds).

7 Natural Systems Modifications

7.2 Dams and Water Management/Use

7.2.1 Abstraction of Surface Water (domestic use) (Avg. Score: 2.00)

NJ Specific Threats: 7.2.1.3 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, and eliminates shallow water habitats.

7.2.2 Abstraction of Surface Water (commercial use) (Avg. Score: 2.00)

NJ Specific Threats: 7.2.2.1 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, eliminates shallow water habitats, and disrupts/removes stream bottom habitat.

7.2.2.4 Water intake systems associated with industrial use and power plants threaten aquatic organisms due to injury or mortality from impingement and/or entrainment.

7.2.3 Abstraction of Surface Water (agricultural use) (Avg. Score: 2.00)

NJ Specific Threats: 7.2.3.2 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, and eliminates shallow water habitats.

7.2.3.4 Water intake systems associated with agriculture threaten aquatic organisms due to injury or mortality from impingement and/or entrainment.

7.2.12 Culverts (Avg. Score: 1.00)

NJ Specific Threats: 7.2.12.1 Improper design, placement, installation and maintenance of culverts and other stream crossing structures can impede or prevent the movements of terrestrial organisms and can restrict or limit stream flow, impeding the movement of aquatic organisms along riparian corridors.

7.3 Other Ecosystem Modifications

7.3.1 Shoreline Stabilization (Avg. Score: 3.00)

NJ Specific Threats: 7.3.1.1 Efforts to stabilize barrier islands and shorelines, including jetties, groins, bulkheads, interfere with the natural geological processes needed to create and maintain high quality habitat for beach strand species.

7.3.1.2 Efforts to stabilize stream corridors, particularly near roads and infrastructure, in which vegetated and dynamic shorelines are replaced with unvegetated and rigid structures such as rip-rap, gabion, concrete raceways and bulkheads interfere with fish spawning, nursery and foraging areas.

7.3.2 Inappropriate timing of mowing (Avg. Score: 2.00)

NJ Specific Threats: 7.3.2.1 Increased risk of direct mortality and/or reduced productivity of wildlife, as well as reduced use by migrating species.

7.3.3 Removal of coarse woody debris (streams, forests, scrub-shrub habitats) (Avg. Score: 1.00)

NJ Specific Threats: 7.3.3.3 Removal of dead trees (snags), large felled logs (i.e., those > 12" dbh), and other downed woody material diminishes nesting, roosting, and sheltering options for wildlife, and increases the ease at which deer can browse regenerating vegetation.

7.3.5 Poor habitat management (Avg. Score: 1.00)

NJ Specific Threats: 7.3.5.1 Improper or poorly scheduled maintenance of man-made corridors (e.g., roadsides and medians) can cause direct mortality to and may reduce productivity of wildlife.

7.3.5.3 Vegetation clearing removes terrestrial and riparian corridors for animal movement, shelter, and resting areas.

7.3.5.4 Vegetation clearing or inappropriate alteration adjacent to aquatic habitats threatens aquatic species by degrading habitat and water quality (altering temperature and dissolved oxygen, increasing siltation and desiccation, etc.).

7.3.5.6 Habitat management, including that which occurs on public and private lands, that does not consider timing and species' behaviors can result in the direct mortality and/or alteration or loss of habitat.

7.3.5.7 Improperly planned habitat management and/or mitigation efforts along roadsides and within the medians can attract wildlife and increase the risk of vehicle strikes.

7.3.5.9 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, eliminates shallow water habitats, and disrupts/removes stream bottom habitat.

7.3.5.10 Ditching, draining and filling of marshes and wetlands eliminates habitat and degrades the remaining surrounding areas for wildlife.

7.3.5.11 Salt marsh water management to control mosquitoes may result in negative effects on other species (e.g., changing hydrology of low and high marsh).

7.3.5.13 Private landowners with rare species on their properties are not always cooperative in the protection and management of the species' habitats. Landowners may be held accountable for their actions when they cause harm to the species or destroy the habitat, but it is often too late for the species' population.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.1.1.5 Invasive, non-native animals and plants increase the risk of introduction and transference of diseases

8.1.1.6 Invasive, non-native plants may create physical barriers for some species.

8.1.2 Invasive non-native aquatic animals (Avg. Score: 1.00)

NJ Specific Threats: 8.1.2.2 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminishing habitat suitability and reducing ecological integrity of natural communities, and may introduce disease into a population.

8.1.4 Invasive non-native terrestrial/wetland animals (Avg. Score: 1.00)

NJ Specific Threats: 8.1.4.2 Free-roaming and feral domestic animals such as cats and dogs causes direct mortality of wildlife and disturbance to wildlife breeding and resting areas.

8.1.5 Invasive non-native terrestrial/wetland plants (Avg. Score: 1.00)

NJ Specific Threats: 8.1.5.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.2 Problematic Native Species/Diseases

8.2.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.2.1.2 Invasive pathogens and insects may increase in range and abundance as limiting factors (such as temperature) are altered as a result of climate change.

8.2.2 Named Species (Avg. Score: 1.00)

NJ Specific Threats: 8.2.2.2 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.4 Problematic Species/Diseases of Unknown Origin

8.4.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.4.1.1 Non-native or poorly understood diseases and parasites could potentially impact native animals.

8.5 Viral/Prion-induced Diseases

8.5.1 Unspecified Species (Disease) (Avg. Score: 1.00)

NJ Specific Threats: 8.5.1.1 There is a large knowledge gap regarding the existence of, or potential for, other diseases impacting native wildlife.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.1 Domestic and Urban Waste Water

9.1.1 Sewage (Avg. Score: 1.00)

NJ Specific Threats: 9.1.1.1 Degradation of aquatic and marine water quality and habitats by changing turbidity, flow and water chemistry.

9.1.1.2 Leads to increased eutrophication and algae blooms that result in oxygen depletion.

9.1.1.3 Contaminants in sewage treatment effluents and Combined Sewer Overflows can cause developmental and behavioral abnormalities and reproductive failure in wildlife.

9.1.2 Run-off (Avg. Score: 1.00)

NJ Specific Threats: 9.1.2.1 Chemical fertilizers and nutrient run-off changes the pH in streams and ponds and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.1.2.2 Contaminants degrade aquatic and marine water quality and can bioaccumulate in benthic organisms, threatening wildlife by causing developmental and behavioral abnormalities and reproductive failure.

9.1.2.3 Contaminants from road runoff (oil, sediment, salt, etc.) impact native vegetation and the species that rely upon them, degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2 Industrial and Military Effluents

9.2.1 Oil Spills (Avg. Score: 2.00)

NJ Specific Threats: 9.2.1.1 Oil spills render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.1.2 Oil spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.1.3 Oil spills cause external oiling of wildlife and ingestion of oil, both of which can injure or kill wildlife.

9.2.3 Other (Avg. Score: 1.00)

NJ Specific Threats: 9.2.3.1 Point and nonpoint source pollution such as polychlorinated biphenyls (PCBs), pesticides, heavy metals, and endocrine disrupting compounds (EDC's) into freshwater and marine systems pose threats to wildlife through direct contact and/or ingestion, and to aquatic species and their predators through bioaccumulation, impacting the reproductive success and neurological function of many avian and fish species.

9.2.3.2 Chemical spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.3.3 Chemical spills may render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.3 Agricultural and Forestry Effluents

9.3.1 Nutrient Loads (Avg. Score: 1.00)

NJ Specific Threats: 9.3.1.1 Chemical fertilizers and nutrient run-off changes the pH in streams, ponds and wetlands and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.3.1.2 Animal waste degrades terrestrial and aquatic habitats, especially streams, ponds and wetlands, resulting in eutrophication, which disrupts oxygen and nutrient balances, and causes injury and mortality to aquatic organisms.

9.3.1.3 Organic nutrient inputs from aquaculture may, depending upon type and location, adversely impact intertidal and subtidal habitats and water bodies where there is insufficient tidal flushing.

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture (Avg. Score: 1.00)

NJ Specific Threats: 9.3.5.4 Improper use of current insecticides, such as those containing esfenvalerate, prallethrin, or piperonyl butoxide, or past use of pesticides containing chlordane still present in the soils, are toxic to various wildlife species, and can cause injury, mortality, or other effects that impair population viability.

9.4 Garbage and Solid Waste

9.4.1 Direct hazards to wildlife (Avg. Score: 2.00)

NJ Specific Threats: 9.4.1.1 Wildlife may ingest garbage causing choking or impingement in the digestive system, or they may become physically entangled in it (e.g., plastic or abandoned fish nets); conditions that make them unable to feed or drink, cause them to suffocate or drown, or otherwise restrict the animal's movement making them more susceptible to predators, starvation or injury.

9.5 Air-Bourne Pollutants

9.5.1 Acid Rain (Avg. Score: 1.00)

NJ Specific Threats: 9.5.1.1 Causes acidification of water bodies, resulting in changes to aquatic and marine communities and reducing biodiversity, and creating conditions that are unsuitable for some aquatic (freshwater and marine) and semi-aquatic species that are sensitive to pH shifts.

9.5.6 Herbicides and Pesticides (Avg. Score: 1.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

9.6 Excess Energy

9.6.2 Thermal Pollution (Avg. Score: 1.00)

NJ Specific Threats: 9.6.2.1 Water temperature changes due to industrial discharge of heated water may impact species composition in the receiving waterbody. Species such as sea turtles and migrating fish may be attracted to the thermal plume and become more vulnerable to mortality during emergency shutdowns during cooler months.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 1.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.3 Temperature Extremes

11.3.1 Temperature extremes (Avg. Score: 1.00)

NJ Specific Threats: 11.3.1.3 Temperature extremes of surface water and air degrades marine habitats and ecosystems, threatening marine wildlife. Such extremes also disrupt offshore currents and migratory patterns, species' ranges, and/or impact communities/food chains, all of which further impact the ecosystem.

11.3.1.4 Extremely low temperatures and/or extensive periods of unseasonably low temperatures during critical life history stages (e.g., hibernation, gestation/nesting) can alter animals' behaviors and decrease survivorship.

11.4 Storms and Flooding

11.4.1 Storms and flooding (Avg. Score: 3.00)

NJ Specific Threats: 11.4.1.1 Extreme storms and flooding events threaten aquatic and marine wildlife through habitat degradation and alteration, including alterations to off-shore or back-bay benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic and marine wildlife.

11.4.1.2 Potentially damage coastal habitats, including beach- and marsh-nesting bird habitats and interdunal wetlands, and can increase marsh erosion.

11.4.1.3 Increase risk of saltwater intrusion to freshwater habitats altering the water chemistry and potentially altering aquatic wildlife community.

11.4.1.7 Potentially damage coastal habitats, including beach and marsh habitats used by spawning horseshoe crabs, nesting diamondback terrapins, and resting and foraging birds.

11.4.2 Increased rainfall (Avg. Score: 1.00)

NJ Specific Threats: 11.4.2.1 Extreme rain events threaten aquatic wildlife through habitat degradation and alteration, including alterations to benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic wildlife.

11.4.2.2 Extreme rain events can damage wildlife nesting and resting habitats, including impacts to avian eggs and chick and small mammal survivorship.

11.4.2.3 More frequent rain events can alter terrestrial and wetland vegetation communities as well as wetland hydrology, shifting wildlife community use.

11.6 Phenology Shifting or Alteration

11.6.2 Phenology shifts related to predator-prey ecology (Avg. Score: 1.00)

NJ Specific Threats: 11.6.2.2 Shifts timing of species migration, breeding and hibernation, and available food resources, causes redistribution of species, or mortality for species that are unable to relocate due to their already isolated habitat or limited mobility.

11.6.3 Phenology shifts related to species redistribution (Avg. Score: 1.00)

NJ Specific Threats: 11.6.3.1 Shifts in timing of species migration, breeding and hibernation, and available food resources, as a result of wildlife range shifts driven by climate change.

11.6.3.2 Shifts in nesting times or egg incubation durations can limit nest success and longterm populations.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 2.00)

NJ Specific Threats: 12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.1.4 Lack of information on the morphometrics and trends of coastal salt marshes and salt marsh islands.

12.1.1.5 Lack of information regarding the SGCN populations that use managed salt marshes and the best techniques for making improvements for marsh-dependent SGCN wildlife.

12.1.2 Lack of up-to-date existing information (Avg. Score: 2.00)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.3 Need to answer research question (Avg. Score: 2.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.4 Need to develop new technique (Avg. Score: 1.00)

NJ Specific Threats: 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 1.00)

NJ Specific Threats: 12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 1.00)

NJ Specific Threats: 12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.

12.4.0.4 Lack of a mandatory reporting system for lost crab traps threatens diamondback terrapins and other marine species due to persistent trapping/attraction of organisms by ghost pots.

12.4.0.6 Techniques for ecological management or restoration of shorelines are not fully developed or evaluated for effectiveness for target and non-target SGCN in coastal areas.

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 1.00)

NJ Specific Threats: 14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 2.00)

NJ Specific Threats:

14.2.1.2 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various aquatic and riparian management practices.

14.2.1.3 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various coastal management practices.

14.2.1.4 Need to develop greater understanding of and support for efforts implemented to maintain disturbance-free habitats that allow coastal wildlife populations to thrive alongside human residential and recreational uses.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 1.00)

NJ Specific Threats:

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.3 Secure and promote the protection/restoration of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through incentive programs.

1.2.1.6 Secure and promote the protection/restoration of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers through incentive programs.

1.2.1.7 Secure and promote the protection/restoration of fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.14 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of herbicides and pesticides, and implementing more ecologically safe strategies when using such products.

1.2.1.20 Coordinate across government agencies and non-government organizations to create or expand upon tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMP's.

1.2.1.25 Create incentives (non-monetary and/or monetary) within State regulations to assist and programs to deliver those incentives to aquaculture growers to relocate, for example, from intertidal to subtidal lease areas through buyouts of leases or microloans, and/or promoting on-lease conservation measures used by aquaculture growers (such as the implementation of conservation easements, use of living shorelines, incorporation of BMPs for habitat protection, etc.) for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

2 Direct Management of Natural Resources

2.1 Create new habitat or natural processes

2.1.1 Habitat conversion

2.1.1.1 Create high marsh habitat through impoundments and diking of low marsh areas that are less susceptible to breaching by storms and sea-level rise.

2.2 Dam and barrier removal

2.2.1 Culvert work

2.2.1.1 Replace existing barriers to wildlife movement with and/or install appropriately-sized systems to accommodate wildlife dispersal.

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.5 Implement biologically safe and appropriate control/management strategies, and where appropriate, eradication strategies to reduce the impacts and/or limit the distribution of invasive and/or non-native plant species within or near aquatic systems using methods that will provide the most protection to the aquatic and riparian ecological system, and minimize disturbance to the soil and wildlife. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.8.0.6 Implement long-term management of invasive and/or non-native plants to help maintain functioning ecological systems and biological diversity, and to enhance travel corridors. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.9 Living shorelines

2.9.1 Beach renourishment

2.9.1.1 Implement best management practices for using mined sand or dredged material to improve habitat for wildlife, particularly for spawning horseshoe crabs and migrating shorebirds.

2.9.1.3 Where beach renourishment projects are deemed necessary, implement such projects with a design to increase availability of nesting and foraging habitat for beach nesting birds.

2.9.1.4 Implement beach renourishment strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimizes harm to wildlife, particularly SGCN.

2.9.1.5 Expand the acreages and enhance the effective size of SGCN habitats by utilizing beach renourishment to restore adjacent, less optimal or unsuitable, habitats.

2.9.1.6 Reclaim degraded rare species habitats using beach renourishment, when appropriate, to restore habitat value for the documented/target SGCN.

2.9.1.7 Protect significant natural and/or unique communities by implementing best management practices for beach renourishment, when applicable.

2.9.1.8 Minimize habitat loss of critical coastal beach habitats that provide nesting, migrating, and wintering areas for birds and other coastal species by maintaining or enhancing these areas through beach renourishment.

2.9.1.14 Implement best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated beach habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.9.1.15 Implement beach management strategies to benefit urban-associated SGCN.

2.9.1.16 Prevent or ameliorate near-term impacts of climate change throughout the State but in particular within the coastal and Delaware Bay areas by implementing habitat management strategies that will establish/improve habitat resilience, such as beach renourishment, that benefits wildlife inhabiting these areas.

2.9.2 Erosion control structures

2.9.2.1 Install breakwaters in the form of living shorelines to reduce the impact of wave erosion while preserving the natural character of the site.

2.9.3 Sand dune restoration

2.9.3.1 Prevent or ameliorate near-term impacts of climate change throughout the State but in particular within the coastal and Delaware Bay areas by implementing habitat management strategies that will establish/improve habitat resilience, such as sand dune restoration, that benefits wildlife inhabiting these areas.

2.9.3.2 Implement sand dune restoration strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimizes harm to wildlife, particularly SGCN.

2.9.3.3 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through sand dune restoration.

2.9.3.4 Reclaim degraded rare species habitats using sand dune restoration needed to restore habitat value for the documented/target SGCN.

2.9.3.5 Protect significant natural and/or unique communities by implementing best management practices for sand dune restoration.

2.9.3.12 Implement best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated sand dune habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.4 Restore and/or enhance suitable travel corridors connecting conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.8 Protect significant natural and/or unique communities by implementing best management practices when conducting habitat restoration strategies.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.10 Minimize the loss of important habitats (e.g., coastal scrub-shrub and grassy habitats, high and low marsh habitats, etc.) that provide nesting, migrating, and wintering areas for SGCN birds and other coastal and marsh-dependent species through habitat restoration efforts.

2.10.0.12 Create and/or maintain scrub-shrub habitats through revegetation efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.10.0.24 Use NJ's CHANJ mapping and guidance to establish vegetation and enhance or create corridors between fragmented habitats with similar vegetation, slope, soils, structure, etc. to ensure vegetative integrity is maintained to allow wildlife to safely disperse, and corridors are buffered with natural habitats to minimize disturbance to wildlife within the corridors.

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.11.0.3 Create suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats through vegetation management.

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.6 Reclaim degraded rare species habitats by conducting vegetation management needed to restore habitat value for the documented/target SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.9 Minimize habitat loss of critical coastal habitats that provide nesting, migrating, and wintering areas for birds and other coastal species by maintaining or enhancing these areas through vegetation management.

2.11.0.13 Implement best management practices (BMPs), protective strategies, and guidelines for vegetation management to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.11.0.14 Conduct vegetation management adjacent to roads for SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.11.0.16 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.11.0.20 Create and/or maintain scrub-shrub habitats through management efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.11.0.21 Minimize the degradation, alteration and/or changes in hydrology of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and subsequent disturbances to and behavioral changes of wildlife by maintaining or enhancing these areas and biologically appropriate buffers through habitat management and/or revegetation or restoration efforts.

2.11.0.22 Minimize habitat loss of high and low marsh habitats that provide nesting, migrating and wintering areas for SGCN birds and other marsh-dependent SGCN by maintaining or enhancing these areas through habitat management and/or revegetation or restoration efforts.

2.11.0.26 Conduct vegetation management along roadsides and medians, avoiding peak activity periods for wildlife, that enhances wildlife dispersal naturally and safely across roads and similar barriers to/between terrestrial and/or aquatic habitats.

2.11.0.34 Increase structural habitat diversity by managing residential, commercial and recreational areas' landscapes for a variety of species. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.35 Increase structural habitat diversity by managing vegetation adjacent to aquatic habitats in a manner that provides a buffer from runoff and erosion and a microclimate to stabilize seasonal temperatures to benefit a variety of aquatic and semi-aquatic species.

2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.

2.11.0.37 Increase structural habitat diversity by minimizing the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats which benefits wildlife.

2.11.0.40 Increase structural habitat diversity surrounding areas used for energy, mining, and transportation and service corridors by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides, and avoid managing habitat during the breeding seasons for ground-nesting birds, reptiles, amphibians and small mammals.

2.11.0.42 Increase structural habitat diversity within wind farms for terrestrial bound and low-flying species and around wind farms for other wildlife by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.44 Manage phragmites adjacent to coastal marshes of interest, in particular those that are within underdeveloped areas and are unprotected, through herbicide application and water management to improve resiliency of the marshes to sea level rise.

2.12 Water management

2.12.1 Ditch plugs

2.12.1.1 Implement best management practices (BMPs), protective strategies, and guidelines for ditch plugging to maintain and enhance healthy, resident and migratory SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.12.3 Drainage

2.12.3.2 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) such as removing drainage ditches to restore natural stream flows and wetlands, that benefit wildlife inhabiting these areas.

2.12.3.3 Remove tile drains and drainage ditches to improve wetland hydrology and restore natural stream flows during appropriate times to avoid sensitive periods (e.g., nesting, denning, roosting) and minimizes harm to wildlife, particularly SGCN.

2.12.3.4 Expand the acreages and enhance the effective size of SGCN habitats by reclaiming/restoring adjacent, degraded habitats by removing tile drains and drainage ditches.

2.12.3.5 Remove drainage ditches adjacent to roads to decrease the attraction for amphibians, reptiles and small mammals, and thereby minimizing road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.12.3.6 Protect significant natural and/or unique communities by and when removing tile drains and drainage ditches.

2.12.3.7 Minimize habitat loss of critical coastal habitats that provide nesting, migrating, and wintering areas for birds and other coastal species by maintaining or enhancing these areas by removing drainage ditches.

2.12.3.11 Implement best management practices (BMPs), protective strategies, and guidelines when removing tile drains and drainage ditches to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.12.7 Waterfowl impoundment maintenance

2.12.7.1 Manage impoundments to benefit SGCN species inhabiting them (e.g., bitterns, rails, ducks, turtles and some invertebrates).

2.12.7.3 Implement best management practices (BMPs), protective strategies, and guidelines for impoundment management to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.12.7.4 Implement impoundment management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimizes harm to wildlife, particularly SGCN.

2.12.7.7 Protect significant natural and/or unique communities by implementing best management practices for impoundment management.

2.12.7.13 Manage impoundments adjacent to roads for SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., marsh birds, amphibians, turtles, small mammals).

2.12.7.14 Prevent or ameliorate near-term impacts of climate change throughout the State but in particular within the coastal and Delaware Bay areas by implementing habitat management strategies that will establish/improve habitat resilience, such as impoundment management, that benefits wildlife inhabiting these areas.

2.12.8 Watering facilities

2.12.8.2 Manage water levels in impoundments to improve coastal marsh habitat availability to wildlife and improve resiliency of the marshes to sea level rise.

2.13 Wildlife damage management

2.13.0 Nuisance fish and wildlife damage

2.13.0.2 Develop, implement and evaluate the effectiveness of BMPs for mosquito control methods that may produce benefits for coastal marsh dependent SGCN wildlife, including but not limited to high-marsh nesting birds and migrating shorebirds and landbirds.

2.13.0.5 Investigate the impacts of human-subsidized and/or naturally occurring predator species on SGCN to assess the need for integrated wildlife damage management techniques (e.g., predator exclosures, fish blockages, electric fence, culls) and/or policy changes on state land management that minimize the impacts of human-subsidized predators.

2.13.0.8 Implement and assess management strategies to control and reduce the impacts of detrimental species and diseases that pose threats to native wildlife or communities.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.6 Conduct long-term studies on resident and migratory SGCN to determine if there are changes to the populations' demography (productivity, survival, dispersal) and/or to their critical and/or supporting habitats (i.e., diminishing in value, acreage or connectivity, etc.), in particular changes that would not maintain SGCN at viable levels for species populations. Update data and GIS maps; provide updated information to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.19 Identify the presence and status (e.g., functioning, structure, slated for removal, etc.) of existing dams and culverts within and/or that may impact SGCN and their habitats, and create a database that includes a GIS component identifying the locations of such structures and their status. Share this information with appropriate organizations and/or agencies evaluating the benefits and risks of such structures on SGCN and their habitats.

3.0.0.21 Conduct long-term monitoring to determine the impacts of the fish and shellfish aquaculture industries on focal and non-focal SGCN and their habitats (i.e., NJ bays, estuaries, ocean areas). Assess the success of management actions implemented to minimize these impacts and make specific recommendations to the NJ DEP regarding how such management efforts may be improved to minimize harm to wildlife and their habitats.

3.0.0.23 Identify (through wildlife and aquatic system surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and research water quality parameters for all [types of] aquatic systems for various SGCN populations.

3.0.0.27 Evaluate the effectiveness of strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals through research and monitoring. Develop and provide NJ DEP and other appropriate governing agencies/commissions a summary of findings and recommendations to improve such efforts.

3.0.0.28 Evaluate best management practices for using mined sand or dredged material to improve habitat for wildlife, particularly for spawning horseshoe crabs and migrating shorebirds.

3.0.0.29 Conduct long-term monitoring of sensitive marine species habitats and migration and/or spawning areas to determine their continued use or changes as a result of habitat shifts or alterations that may warrant further management actions.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.2 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.0.5 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

3.2.0.6 Develop, implement and conduct studies to evaluate the effectiveness of methods implemented to reduce road mortality of wildlife (e.g. wildlife underpasses, road closures).

3.2.0.12 Investigate the impacts of ORV use and ORV-created noise on terrestrial and aquatic wildlife behavior and the impact of direct mortality from vehicle strikes. Integrate this information when mapping undeveloped roads and trails to identify potentially sensitive areas in northern NJ forests.

3.2.0.16 Conduct long-term monitoring to evaluate the success of marine conservation zone designations on marine SGCN.

3.2.0.19 Develop, implement and evaluate aquaculture practices in coastal areas that are compatible with the recovery of SGCNs and industry needs.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.2 Age, size and sex structure

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.3 Baseline inventory

3.2.3.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) suitable areas for marine conservation zone designation and promote policies and regulations that support the designation of such areas.

3.2.3.5 Investigate and develop strategies to reduce "by-catch" of SGCN and other non-target species. Present findings and strategies to NJ DEP and conservation organizations for review and possible implementation. Develop a database documenting by-catch for use in management planning decisions.

3.2.3.7 Identify roads or portions of roads, paved or unimproved (through site surveys, land use/land cover assessments and analyses, review of available data, enlistment of species experts, etc.) with high incidences of road mortality and/or presence of snakes, turtles, medium-sized and large mammals. Conduct assessments of the roads and incorporate information into a database that includes descriptions (e.g., qualifiers to help prioritize the roads' risk to wildlife) and a GIS component of the locations of such areas. Share this information with appropriate organizations and/or agencies working to implement measures (e.g., wildlife passages, road closures) to minimize the risk to these species.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.6 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) that could, through revegetation and/or enhancement efforts, become suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN.

3.3.1.11 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the quality and importance of areas with submerged aquatic vegetation to benefit waterfowl, finfish, and shellfish species.

3.3.1.16 Gather "best information" for spatial modeling and update/create a current model/depiction of anticipated habitat shifts from sea-level rise, flooding, etc.

3.3.1.18 Conduct an assessment using available data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels.

3.3.1.19 Identify and codify legal ORV access areas on state (and if appropriate, other conserved) lands. Provide GIS mapping to the landowner for potential use in directing such recreational activities.

3.3.1.21 Conduct comprehensive baseline surveys of all marsh islands; surveys to include, but are not limited to, documented elevations, and assessments of the habitat's current condition and vulnerability of dependent SGCN species in relation to the increased inundation rate.

3.3.1.22 Identify, assess and prioritize marsh habitats for restoration where various management tools (such as increasing salinity through the management of water levels or chemical applications) may be effective in reducing the presence of phragmites.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.1.27 Develop a matrix that lists every commercial and recreational fishery and aquaculture facility that operates in state waters and for each fishery listed, provide details regarding their fishing seasons, gear descriptions, locations and number of fishers. Add a GIS component to overlay species of concern and sensitive areas.

3.3.1.29 Identify coastal wildlife habitats unimpacted by development and/or at greatest risk of habitat loss to help guide enlightened coastal stabilization efforts (i.e., use of soft stabilization) to reduce the impacts on wildlife and their habitats.

3.3.1.30 Using available data, model a comprehensive Marine Submerged Aquatic Vegetation Mapping project (similar to the Statewide freshwater wetlands mapping project) of sufficient quality and integrity that it could support the NJ DEP's coastal regulatory programs. Continue to conduct surveys to gather additional data to test and improve the model.

3.3.2 Monitoring

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.5 Conduct long-term monitoring of water quality of SGCN aquatic habitats (and aquatic systems feeding into those habitats) to evaluate protection and management efforts to reduce, if not eliminate, chemical contamination, siltation, eutrophication, and other forms of pollution/contamination of aquatic systems.

3.3.2.6 Investigate the effectiveness and potential impacts of marsh management techniques by studying the effects of Open Marsh Water Management on wildlife species, in particular high marsh nesting birds and waterfowl. Evaluate best management practices as appropriate.

3.3.2.7 Conduct studies on land use practices such as ditching, impounding, dredging, open marsh water management, burning, and marsh restoration to evaluate the effectiveness and potential impacts on marsh-dependent SGCN.

3.3.2.14 Research and evaluate the effectiveness of water quality management practices on water-dependent and semi-dependent SGCN, particularly those practices associated with permitting or mitigation actions.

3.3.2.15 Investigate the effectiveness of management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.3.2.19 Once baseline data on the marsh islands' and associated SGCN species' vulnerability to inundation is completed, continue to conduct long-term monitoring the islands to determine sustainability for wildlife dependent on these areas.

3.3.2.20 Once a system is developed for reporting and qualifying new locations of invasive species, develop, implement and monitor/evaluate invasive species removal strategies at identified locations. Priority should be given to those areas critical to SGCN and/or contain unique and/or rare plant communities supporting SGCN and/or other fish/wildlife species.

3.3.2.21 Develop, implement and evaluate the effectiveness of management strategies use to restore marsh habitat (e.g., phragmites reduction).

3.3.2.23 Conduct long-term monitoring of marine submerged aquatic vegetation and update the Marine Submerged Aquatic Vegetation Mapping [to be developed under baseline activities] to provide the NJ DEP's coastal regulatory programs with the most current data.

3.5 Techniques development

3.5.1 Artificial propagation studies

3.5.1.1 Conduct studies to evaluate the impacts (beneficial and detrimental) of aquaculture on migratory shorebirds, waterfowl, finfish, shellfish and other SGCN and their habitats, including evaluation of the relative effects of location and aquaculture techniques.

3.5.1.2 Develop and conduct studies that evaluate relative efficacy and feasibility of management actions designed to minimize adverse impacts and enhance beneficial effects.

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.4 Modify best management practices of Open Marsh Water Management based on evaluation of the effectiveness and potential impacts of marsh management techniques on wildlife species, in particular high marsh nesting birds and waterfowl.

3.5.3.5 Develop best management practices for using mined sand or dredged material to improve habitat for wildlife, particularly for spawning horseshoe crabs and migrating shorebirds.

3.5.3.8 Develop best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5.3.9 Develop strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

3.5.3.10 Develop a habitat improvement and restoration program to restore cold-water fish habitat.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.12 Develop management actions to minimize the documented adverse impacts and reduce risks of potential adverse impacts of aquaculture on migratory shorebirds and other SGCN, including waterfowl, finfish, and shellfish and their habitats.

3.5.3.13 Developing engineering standards that embrace both shore protection/resiliency and habitat creation for shorebirds, horseshoe crabs and other coastal species along the Atlantic and Delaware Bay coasts.

3.5.3.14 Develop aquaculture practices in the coastal areas that are compatible with the recovery of SGCN.

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.3.16 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.3.17 Investigate and improve marsh management techniques to benefit critical wildlife species, in particular high marsh nesting birds and waterfowl.

3.5.3.18 Develop recommendations to improve methods on land use practices such as ditching, impounding, dredging, open marsh water management, burning, and marsh restoration based on potential impacts on marsh-dependent SGCN.

3.5.3.24 Based on research, modify management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.3.27 Conduct an assessment and develop a location list of available equipment for boom deployment during oil spills.

3.5.3.28 Conduct baseline surveys to determine areas in Barnegat and Great bays appropriate for eelgrass restoration. Develop necessary techniques to implement restoration efforts.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.3 Investigate alternative saltmarsh mosquito control methods that may produce benefits for coastal marsh dependent SGCN wildlife, including but not limited to high-marsh nesting birds and migrating shorebirds and landbirds.

3.5.4.5 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

3.5.4.9 Conduct studies to evaluate the impacts of roads on SGCN and develop, implement and conduct studies to evaluate the effectiveness of methods to reduce road mortality of wildlife (e.g. wildlife underpasses, road closures).

3.5.4.11 Develop aquaculture practices in the Delaware Bay that are compatible with the recovery of SGCN.

3.5.4.12 Investigate and develop strategies to reduce "by-catch" of SGCN and other non-target species. Present findings and strategies to NJ DEP and conservation organizations for review and possible implementation. Develop a database documenting by-catch for use in management planning decisions.

3.5.4.13 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.4.14 Develop and implement agreements, and update existing agreements, with government agencies regarding the protection of critical SGCN habitats (e.g., significant breeding populations of beach nesting birds, colonial waterbird nesting areas, bat colonies, etc.).

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.17 Investigate new, non-invasive techniques for SGCN population evaluation through literature review, expert opinion, trial studies (if low risk), etc.

3.5.4.18 Investigate the effectiveness of survey techniques through selected “ground truthing” and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

3.5.4.21 Develop BMPs to address problematic species and diseases of unknown origin.

3.5.4.23 Reduce the impacts of entrainment, impingement and thermal discharge at power plants by working with conservation partners, academia, etc. to ensure that best available technologies are utilized wherever possible.

4 Education

4.1 Educator/Instructor training

4.1.1 Aquatic resource education

4.1.1.1 Provide educational resources and training programs to teachers in aquatic resource education that includes information regarding climate change and sea-level rise for incorporation into the class curriculum and/or as the focus of school field trips.

4.1.1.2 Provide educational resources and training programs to teachers in aquatic resource education that includes information regarding how coastal stabilization negatively impacts wildlife by preventing natural processes for incorporation into the class curriculum and/or as the focus of school field trips.

5 Facilities and Areas

5.15 Wildlife Management Areas

5.15.6 Roads

5.15.6.2 Clearly post areas/trails where vehicle access is not permitted.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.3 Secure and protect riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.5 Secure and protect critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.8 Secure and protect scrub-shrub habitats for SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.3 Increase the protection of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through conservation area designations.

6.3.0.5 Promote the protection of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through conservation area designations.

6.3.0.8 Promote the protection of scrub-shrub habitats for SGCN through conservation area designations.

6.3.0.9 Promote the protection of critical marine habitats for SGCN through conservation area designations.

7 Law Enforcement

7.1 Law enforcement

7.1.3 Sub-national Level

7.1.3.1 Enforce slow wake zones and marine conservation area regulations to protect aquatic vegetation.

7.1.3.2 Increase the number of law enforcement officers tending to wildlife issues to a reasonable number to sufficiently cover the State and marine waters.

7.1.4 Scale Unspecified

7.1.4.1 Improve enforcement of policies and/or regulations that promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

7.1.4.3 Increase law enforcement presence proximate to sensitive areas [e.g., avian nesting sites, in particular rookeries, and reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively)] to deter human activity and subsequent disturbance to SGCN.

7.1.4.4 Improve enforcement of policies/regulations aimed at protecting and preserving critical coastal and marsh habitats, and secure mitigation for losses that create an environmental benefit.

7.1.4.5 Enforce current policies and/or regulations to increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal SGCN, and implement and enforce amended policies/regulations.

7.1.4.6 Recruit law enforcement to assist in the protection and enhancement of SGCN populations, in particular endangered species, through improved awareness of species through trainings, partnerships, and other methods. Information should include but is not limited to: 1) Issues concerning illegal collection of reptiles, 2) Persecution of rare snakes, 3) Illegal recreational activities on public lands (e.g., off-road vehicles) and their impact on wildlife, 4) Identification of sensitive areas, critical sites and/or "hot-spots" for collection.

7.1.4.7 Increase law enforcement presence to enforce regulations governing recreational activities (e.g., the use of personal watercraft and off road vehicles, caving, rock climbing, etc.) on conserved lands and within other sensitive habitats, and discourage activities that cause harm or disturbance to vegetation, wetlands, fish and wildlife.

7.1.4.9 Implement policies that improve and secure habitat connections between conserved SGCN habitats.

7.1.4.10 Implement policies that promotes expanding acreages and enhances the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

7.1.4.11 Implement and enforce policies/regulations that will increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.16 Implement policies that protect and restore riparian areas.

7.1.4.17 Improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

7.1.4.20 Implement policies and/or regulations with the objective of reducing "by-catch" of SGCN and other non-target species.

7.1.4.23 Implement policies that minimize wildlife road mortality.

7.1.4.26 Educate law enforcement personnel that there may be unauthorized research projects taking place and to encourage them to investigate any activities that appear to be harmful to wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.1 Coordinate research efforts among government agencies, non-government conservation partners and other stakeholders to investigate the impacts of aquaculture on migratory shorebirds, waterfowl, finfish, shellfish and other SGCN and their habitats, to determine relative effects of farming locations and aquaculture techniques, and to evaluate management actions to minimize such impacts.

8.1.0.2 Develop a team of personnel from government entities, conservation organizations and other stakeholders engaged in oil/gas spill response for marine and freshwater habitats to develop a feasible plan for oil spill response and/or to amend NJ's current oil spill response plan that clearly outlines each organizations responsibilities and an assessment and location list of available equipment for boom deployment during oil spills.

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.1.0.5 Engage government agencies, conservation partners and other stakeholders in discussions focused on establishing a long-term monitoring program for submerged aquatic vegetation distribution throughout Barnegat, Little Egg Harbor and Great Bay.

8.1.0.6 Engage government agencies, conservation partners and other stakeholders in discussions focused on sharing information regarding coastal and marine critical wildlife habitats, developing comprehensive mapping to assist in reducing impacts of energy production activities, and establishing a long-term monitoring program to update the data. Ensure this information is available to appropriate personnel for planning or response measures.

8.1.0.7 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting coastal boating and recreation communities about eelgrass/widgeongrass, their impacts on marine environments, and the value, fragility and location of submerged aquatic vegetation beds and habitats.

8.1.0.11 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting sportsmen's organizations and fisheries, as well as public constituents, addressing the unintended effects abandoned fishing gear, tackle and crab pots can have on wildlife, and promote the collection and/or reporting of abandoned items and their locations.

8.1.0.12 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting sportsmen's organizations and fisheries, as well as public constituents, addressing the unintended effects fishing gear and tackle can have on wildlife.

8.1.0.16 Engage local governments in discussions regarding the importance of them adopting/passing ordinances which require assessing and addressing secondary impacts (i.e., ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

8.1.0.18 Engage NJDOT, NJ Transit Authority and other road management entities, wildlife conservation organizations/agencies (e.g., Division of Fish and Wildlife, New Jersey Conservation Foundation, Conserve Wildlife Foundation of NJ), and communities and citizens in discussions regarding the importance of and methods to enhance habitat connectivity, and work together to develop feasible strategies for ensuring that wildlife can disperse naturally and safely across roads and similar barriers to terrestrial and/or aquatic habitats.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.20 Organize a small focal group of government and non-government agencies/organizations responsible for decisions regarding beach/dune management to share and coordinate their goals so that comprehensive planning can attempt to meet all needs.

8.1.0.21 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation human-subsidized and/or overabundant, native species cause to local nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.22 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation invasive species cause to native nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.23 Work with the NJ Division of Fish and Wildlife's Bureau of Marine Fisheries, local recreational and commercial fisheries associations, and fishers to develop a process that encourages fishermen to report the number and location of lost pots to the appropriate state agency/agencies at the end of the harvest season.

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.31 Encourage government agencies, conservation partners and other stakeholders to work together to create GIS mapping for marine wildlife and habitat to assist in reducing impacts of energy production activities. Ensure this information is available to appropriate personnel for planning or response measures.

8.1.0.33 Engage government agencies, conservation partners and other land managers, communities, landowners, and commercial and industrial stakeholders in discussions regarding the importance of protecting and methods to protect priority wetlands beyond the levels afforded through regulation by maintaining and/or restoring optimal biological buffers around wetlands.

8.1.0.34 Work with the NJ Education Association and Department of Education to design curriculum and outdoor experimental learning opportunities, and provide training to teachers on implementation of these activities.

8.1.0.36 Reduce "by-catch" of SGCN and other non-target species by enlisting voluntary cooperation to use exclusion devises, appropriate trap sizes, etc. through education and outreach.

8.1.0.37 Enlist landowners and NJ citizens in the protection of and survey efforts for SGCN, in particular rare species, by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management and wildlife-related volunteer programs.

8.1.0.40 Encourage researchers, land managers, naturalists and enthusiasts to follow proper procedures for the coordination and/or permitting of research/management activities involving wildlife and sensitive habitats, and discourage activities that alter vegetation or wetlands, or cause harm or disturbance to wildlife.

8.1.0.41 Engage beach-owning entities (e.g., government, non-government and non-profit organizations, and landowners) in a constructive dialogue to develop guidelines for management of beach/dune communities and to ensure that each group is educated and aware of the needs of the other groups.

8.1.0.42 Engage citizens, wildlife observers and photographers through discussions and distributable information regarding the importance of and encouraging implementing responsible and ethical behavior when observing wildlife by developing an alliance of wildlife photographers and widely circulating recommendations on how to reduce impact.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.1.0.49 Reduce the impacts of entrainment, impingement and thermal discharge at power plants by working with conservation partners, academia, etc. to ensure that best available technologies are utilized wherever possible.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.1 Utilize WSFR grant funds, in combination with alternate funding sources as needed, to implement a scientific data-driven, extensive educational/outreach program targeting sportsmen's organizations and fisheries, as well as public constituents, addressing the potential impacts of over-harvesting wildlife can have on the ecological system and to promote "sustainable harvest".

8.3.0.2 Utilize WSFR grant funds, in combination with alternate funding sources as needed, to implement an extensive educational/outreach program consisting of displays, fliers, list-serve mailings, Facebook posts and speaking engagements with sportsmen's organizations and fisheries, as well as public constituents, addressing the unintended effects fishing gear and tackle can have on non-target species.

8.3.0.4 Utilize WSFR grant funds, in combination with alternate funding sources as needed, to implement an extensive educational/outreach program consisting of displays, fliers, list-serve mailings, Facebook posts and speaking engagements with sportsmen's organizations and fisheries addressing the unintended effects abandoned fishing gear, tackle and crab pots can have on wildlife.

8.3.0.7 Develop and provide (or otherwise make publicly available) educational programs and/or materials that describe the negative impacts of off-road vehicles and watercraft use in and adjacent to critical SGCN habitats, and the importance of confining such activities to more appropriate locations and/or seasons.

8.3.0.8 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate recreationists and encourage landowners to eliminate garbage in the vicinity of suitable wildlife habitat, in particular SGCN habitat. Information should include the detrimental impacts garbage may have on various wildlife species.

8.3.0.9 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners and land managers to include only native plants in landscaping and restoration projects. Provide information to assist them in detecting problematic establishment of invasive, non-indigenous plants.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.14 Develop an educational outreach program using a variety of media to ensure maximizing the distribution of information, in particular targeting sportsmen's organizations and fisheries, regarding the unintended effects abandoned fishing gear, tackle and crab pots can have on wildlife, including non-target species.

8.3.0.15 Develop an educational outreach program for citizens regarding: 1) The impacts to wildlife as a result of plastic bags entering aquatic and marine systems, 2) The importance of decreasing the amount of plastic shopping bags in circulation, 3) The need for businesses to voluntarily charge for bags or reimburse people for using their own non-plastic bags, and 4) The need for their assistance through public pressure on legislators and government to pass legislation that that limits the amount of plastic shopping bags in circulation.

8.3.0.16 Develop an educational outreach program using a variety of media to ensure maximizing the distribution of information, in particular targeting sportsmen's organizations and fisheries, promoting "catch and release" and the impacts excessive harvests can have on wildlife populations.

8.3.0.18 Develop an Eelgrass/Widgeon Grass education and mapping program to educate coastal boating and recreation communities about the value, fragility and location of submerged aquatic vegetation beds and habitats.

8.3.0.19 Develop an educational outreach program for the public on the devastating effects predators can have on native nesting wildlife.

8.3.0.20 Develop an educational outreach program for landowners, particularly those in the coastal and bay areas, boaters, and the general public with information about the negative impacts on marine wildlife and habitats, and steps they can implement to reduce these impacts.

8.3.0.21 Develop an educational outreach program for the general public, in particular those within and adjacent to coastal and riparian areas on the realities of sea-level rise to help citizens living in these areas understand how this will affect them, how coastal stabilization negatively impacts wildlife by preventing natural processes, and how their decisions impact species.

8.3.0.22 Post signage in sensitive coastal habitats (e.g., bird and Diamondback Terrapin nesting areas) to educate the boating community on responsible use of these areas.

8.3.0.23 Develop an educational outreach program for coastal municipalities and residents to promote an understanding of the benefits of soft structures over hard structures for shoreline stabilization.

8.3.0.29 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about the importance of maintaining a vegetative buffer along riparian and aquatic habitats to intercept storm water runoff and minimize soil erosion.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.8 Develop a plan that focuses on strategies for oil pipelines to avoid sensitive habitats that would be highly impacted by oil spills.

9.1.0.15 Develop a plan to minimize fragmentation of terrestrial and aquatic habitats by roads.

9.1.0.17 Develop a plan to minimize nutrient and effluent loads from aquaculture practices.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.23 Develop a plan to mitigate the effects of transportation barriers by using CHANJ products.

9.1.0.26 Develop a plan to minimize any adverse impacts of aquaculture farming techniques and structures on freshwater and intertidal habitats.

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.31 Develop wetland restoration plans that consider the life history and needs of wildlife occupying targeted habitats.

9.1.0.32 Incorporate aquatic habitat connectivity and water quality/effluent standards into local and state aquaculture plans and BMPs.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.2 Organizational strategic and CMS planning

9.2.1 Organizational strategic and operational planning

9.2.1.1 Identify and codify legal ORV access areas on state lands.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.5 Develop response plans to address disease outbreaks within wildlife populations, in particular SGCN.

9.3.1.6 Amend NJ's current oil spill response plan to 1) expand the geographic area addressed, 2) expand the targeted species impacted and in need of recovery, and 3) revise current and integrate new actions into the plan as needed.

9.3.1.7 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.10 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.15 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.1.16 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.2 Listed species recovery planning

9.3.2.1 Develop proactive species recovery plans for all endangered and threatened species including guidance and objectives pertaining to critical and supporting habitat to meet and maintain recovery goals.

9.3.3 Habitat management planning

9.3.3.2 Develop a management plan for using mined sand or dredged material to improve habitat for wildlife, particularly for spawning horseshoe crabs and migrating shorebirds.

9.3.3.4 Create habitat restoration plans to repair marshes and associated beaches damaged by salt hay farm/dike abandonment for all bay shore areas currently degraded.

9.3.3.6 Develop a management plan for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

9.3.3.8 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.3.9 Develop a response plan to outbreaks using BMPs to control infestations and limit their spread in a way that avoids excessive harm to non-target species.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.3.12 Develop a management plan using engineering standards that embrace both shore protection/resiliency and habitat creation for shorebirds, horseshoe crabs and other coastal species along the Atlantic and Delaware Bay coasts.

9.3.3.13 Develop a management plan that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas and prevents or ameliorates near-term impacts of climate change throughout the State, but in particular within the coastal and Delaware Bay areas.

9.3.3.14 Develop a management plan using aquaculture practices in coastal areas that are compatible with the recovery of SGCN.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.16 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.21 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.3.22 Create management plans to minimize and/or prevent wildlife road mortality that will incorporate wildlife passages in conjunction with barrier fencing and, where possible, seasonal closures. Aquatic-associated passages must avoid disturbance to the natural streambeds and riparian habitat, permit high volumes of water to flow freely, and provide adequate travel corridors for terrestrial wildlife, while maintaining stream flow for fish passage. Bridges that span rivers and streambeds and include floodplain habitat on either side of the span to provide travel corridors for terrestrial wildlife are preferred over culverts.

9.3.3.24 Develop a plan to improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

9.3.3.25 Develop a habitat management plan focused on areas important to near-shore, coastal species (e.g., herring, sturgeon, terrapin, nesting birds) that prioritizes these areas to direct resources to minimize the impacts of sea-level rise, flooding and storms (including extreme rain events) such as increased erosion of beach, mudflat and marsh habitats, and the increased risk of saltwater intrusion into freshwater habitats. Gather "best information" for spatial modeling of anticipated habitat shifts from sea-level rise, flooding, etc.

9.3.3.28 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.3.29 Develop habitat management plans aimed at reducing or eliminating negative impacts of ORVs.

9.3.3.31 Using data from baseline inventory and monitoring of all current marsh islands and their vulnerability to inundation as a result of sea level rise, create a plan to delineate each island's ideal fit for habitat management (e.g., restoration, hasting, dredging). Planning will factor in criteria to designate which islands should be maintained or restored, and which will be passively allowed to submerge.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.3 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.6 Review all projects to be conducted in or adjacent to coastal wetlands and marshes, and provide recommendations on how to best avoid or reduce human disturbance at nesting areas (for example, timing restrictions) and actions not permitted.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.9 Review strategies for creating or enhancing connectivity (e.g., installing appropriately-sized wildlife passages) between wetlands to allow wildlife to disperse naturally and safely.

11.1.1.10 Use CHANJ mapping in reviews of proposed energy, mining, transportation and utility service companies/agencies' projects to attempt to maintain habitat connectivity and reduce fragmentation, and identify potential impacts of the projects.

11.1.1.12 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed solar farm projects to reduce habitat fragmentation and minimize impacts on wildlife.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.2.2 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.2.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into the environmental review process to help establish policies and plans that minimize the impact of aquaculture on fish and wildlife.

11.1.2.4 Review strategies for creating or enhancing connectivity (e.g., installing appropriately-sized wildlife passages) between wetlands to allow wildlife to disperse naturally and safely.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.2 Provide technical support to public and private landowners and land managers for controlling invasive, native and non-native plant species in order to increase structural habitat diversity.

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.7 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on the importance of maintaining habitat connectivity, minimizing fragmentation, and the use of CHANJ products to help them target areas for such planning.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.14 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters), and to enhance or restore biologically appropriate buffers.

11.2.0.15 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and landowners about the importance of retaining and in an effort to protect, create, enhance and/or restore vegetation along aquatic habitats.

11.2.0.19 Provide educational resources and technical support to public and private landowners and land managers to promote the protection and/or enhancement of scrub-shrub habitats for SGCN.

11.2.0.20 Provide educational resources and technical support to public and private landowners and land managers to promote the protection and/or enhancement of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN.

11.2.0.23 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to SGCN habitats to promote the protection and/or enhancement of those adjacent habitats to increase the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and that connect conserved SGCN habitats.

11.2.0.24 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers on how to manage vegetated roadside areas (e.g., mowing, brush-hogging, etc.) on a schedule that avoids peak activity periods for wildlife and therefore, minimizes harm.

11.2.0.25 Provide educational resources, training programs, and on-the-ground guidance to resource managers regarding the assessment of and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) related to residential and commercial development.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.0.27 Provide educational resources and presentations to coastal municipalities and residents to promote the understanding of the benefits of soft structures over hard structures for shoreline stabilization.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.1 Engage partners and stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.4 Provide educational resources, training programs, and on-the-ground guidance to dredging companies and resource managers on habitat creation and enhancement away from and outside of shipping lanes, and to identify seasonal timing of activities that would minimize impacts to wildlife and their habitats.

11.2.1.5 Provide educational resources, training programs, and on-the-ground guidance to municipalities, state and federal agency resource managers on tasks such as writing and integrating Beach Management Plans into other management documents.

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

100 Law and Policy

100. Legislation

100.1.3 Sub-national Level

100.1.3.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.3.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.3.4 Initiate legislative action to establish an annual budgetary line item designating funds to support programs and monitoring stations throughout Barnegat, Little Egg Harbor and Great Bay focused on long-term monitoring of submerged aquatic vegetation, both native and exotic species.

100.1.4 County and Local

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.3 Expand the acreages and enhance the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN through local ordinances.

100.1.4.4 Secure wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and biologically appropriate buffers through local ordinances.

100.1.4.8 Secure critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through local ordinances.

100.1.4.11 Secure riparian areas through local ordinances.

100.1.4.12 Secure scrub-shrub habitats for SGCN through local ordinances.

100.1.4.14 Adopt/pass local ordinances which require assessing and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.5.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.5.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into state/local policy to minimize the impact of aquaculture on fish and wildlife.

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.1 Develop (and/or improve) policies and/or regulations that will promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

100.3.0.2 Improve policies/regulations aimed at protecting and preserving critical coastal and marsh habitats and securing mitigation for losses that create an environmental benefit.

100.3.0.4 Promote policies and regulations that support marine conservation zone designations in suitable areas identified through research and literature.

100.3.0.5 Develop policies that will promote improved and secure habitat connections between conserved SGCN habitats.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.7 Amend current policies and/or regulations to increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.13 Develop policies that will promote protecting and restoring riparian areas.

100.3.0.14 Develop policies and/or regulations that increase the protective buffers of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) to biologically appropriate distances to benefit SGCN that rely upon these habitats and improve the function of the [associated] aquatic systems.

100.3.0.15 Develop policies that promote protecting and restoring scrub-shrub habitats to benefit shrub-dependent SGCN.

100.3.0.17 Develop and implement policies and/or regulations with the objective of reducing "by-catch" of SGCN and other non-target species.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.21 Develop policies that minimize wildlife road mortality through: 1) Requiring the integration of wildlife passages into all new and repaired roads, in particular those areas that will connect SGCN habitats, 2) Requiring current fish/wildlife passages be improved and maintained in perpetuity, 3) Supporting seasonal road closures, in particular for unimproved roads, 4) Supporting projects that work to improve connectivity of SGCN habitats such as land conservation through acquisition or other means.

100.3.0.23 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.26 Adopt regulations requiring the combined sewer overflow alternative analyses required by regulation address potential impacts to wildlife in watercourses or receiving water bodies.

100.3.0.27 Amend harvest, license and/or permit requirements to incorporate guidance regarding the use of gear and/or tackle and current best practices to minimize bycatch or entanglement of non-target species.

100.3.0.28 Amend harvest, license and/or permit requirements to require mandatory reporting by permittees/licensees of lost harvest gear, by-catch and, entanglement of non-target species.

100.3.0.29 Amend harvest, license and/or permit requirements to incorporate the exclusion devices and/or to require trap/pot designs with a quick-corrode feature which would render the device ineffective upon short-term sustained submersion.

100.3.0.30 Amend the NJ Bureau of Marine Fisheries commercial licensing and harvest reporting system to require fishermen to report the number and location of lost pots to the appropriate state agency/agencies at the end of the harvest season.

100.3.0.37 Develop a law and/or policy that requires NJ DEP to continue to address and correct the allowable combined sewer overflow inputs of solid waste into the marine environment to minimize harm to wildlife and their habitats.

100.3.0.38 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.3.0.39 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.3.0.40 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.

100.3.0.42 Fully adopt the former Storm water Management Rules' 300ft buffer requirements into the Flood Hazard Area Control Act Rules.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.47 Investigate regulatory options available to direct the location of aquaculture activities in Aquaculture Development Zone 4 (Delaware Bay area) in a manner which minimizes the loss of wildlife habitats and adverse impacts to the environment.

100.3.0.49 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address the issue of disturbance to habitat or species as a result of human activities (e.g., construction, bridge maintenance, road work, etc.).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.53 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded rights-of-way corridors associated with energy transport/transmission.

100.3.0.57 Develop regulations that when implemented will improve and secure habitat connections between conserved SGCN habitats.

100.3.0.58 Develop regulations that when implemented will promote the expansion of acreages and enhancement of the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.59 Develop regulations that when implemented will increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.64 Develop regulations that when implemented will protect and restore riparian areas.

100.3.0.65 Develop regulations that when implemented will protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

100.3.0.66 Develop regulations with the objective of reducing "by-catch" of SGCN and other non-target species.

100.3.0.69 Develop regulations that when implemented will minimize wildlife road mortality.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.3 Develop policies for mandatory buffer strips on preserved farmlands and state-owned agricultural lands.

100.4.0.4 Create a policy that requires the use of wildlife habitat and corridor mapping products for both regulatory use when conducting project reviews and planning/siting new or expanded rights-of-way projects.

100.4.0.5 Create a policy that requires an initial and subsequent updates of a comprehensive marine submerged aquatic vegetation mapping for use by NJ DEP's coastal regulatory program.

100.4.0.7 Develop a law and/or policy that requires NJ DEP to continue to address and correct the allowable combined sewer overflow inputs of solid waste into the marine environment to minimize harm to wildlife and their habitats.

100.4.0.8 Develop a white paper addressing the impacts that existing, new or expanded rights-of-way have upon wildlife, wildlife habitats and habitat connectivity.

100.4.0.10 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.4.0.11 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.4.0.13 Develop policies for different circumstances (e.g., roadsides and medians, riparian, aquatic and terrestrial habitats) that outline appropriate habitat/vegetation management strategies and schedules to minimize risks to and benefit wildlife.

100.4.0.16 Develop policies to implement habitat management strategies that will increase the structural diversity surrounding areas used for energy, mining, and transportation and service corridors which include but are not limited to the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-

100.4.0.17 Develop policies to implement habitat management strategies, including prescribed burns, that will increase the structural diversity on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies to control and reduce the impacts of invasive, non-native species in order to increase structural habitat diversity.

100.4.0.18 Develop policies to minimize the extent of infrastructure associated with energy and service corridors or areas (e.g., wind and solar farms, pipelines, utility lines) and that require the implementation of habitat management strategies that will increase the structural diversity in the area including (e.g., the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides).

100.4.0.19 Develop regulations that will minimize the creation of new barriers, remove or replace current barriers with appropriately-sized systems to accommodate wildlife dispersal, and to minimize road widening and traffic volume increases within critical wildlife habitat areas.

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.21 Ensure that Section 303(d) of the Clean Water Act and applicable State statutory/regulatory requirements for surface water pollutant budgets are being met by monitoring and enforcing regulatory Total Maximum Daily Load (TMDL) targets established within regional Water Quality Management Plans.

100.4.0.22 Work with NJ DEP's Division of Land Use Regulation to ensure protection of listed species and their habitats during stream cleaning events.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Northern Red Salamander

Focal species that comprise this Conservation Target:

Northern Red Salamander

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:

1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.1.1.2 Loss, alteration and/or degradation of habitat.

1.1.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.

1.1.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.

1.1.1.5 Impervious surfaces can lead to a decrease in water recharge.

1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats:

1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.2.1.2 Loss, alteration and/or degradation of habitat.

1.2.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.

1.2.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.

1.2.1.5 Impervious surfaces can lead to a decrease in water recharge.

1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats:

1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.3.1.2 Loss, alteration and/or degradation of habitat.

1.3.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.

1.3.1.4 Impervious surfaces can lead to a decrease in water recharge.

1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture (Avg. Score: 1.00)

NJ Specific Threats: 2.1.1.3 Conversion of agricultural landscape that results in increased erosion, runoff, and chemical and thermal pollution decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.1.2 Small-holder Farming (Avg. Score: 1.00)

NJ Specific Threats: 2.1.2.2 Fragments terrestrial and aquatic habitats.

2.1.3 Agro-industry (Avg. Score: 1.00)

NJ Specific Threats: 2.1.3.2 Fragments terrestrial and aquatic habitats.

2.2 Wood and Pulp Plantations

2.2.1 Small Holder (Avg. Score: 2.00)

NJ Specific Threats: 2.2.1.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.2.1.2 Tree harvesting can cause direct mortality to wildlife, especially if done during peak activity periods or vulnerable life stages (e.g., denning, nesting, gestation/birthing, basking, roosting, pre-volancy, etc.).

2.2.2 Agro-industry Plantations (Avg. Score: 1.00)

NJ Specific Threats: 2.2.2.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.2.2.2 Tree harvesting can cause direct mortality to wildlife, especially if done during peak activity periods or vulnerable life stages (e.g., denning, nesting, gestation/birthing, basking, roosting, pre-volancy, etc.).

2.3 Livestock Farming and Ranching

2.3.2 Small-holder Grazing (Avg. Score: 1.00)

NJ Specific Threats: 2.3.2.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.2.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

2.3.3 Agro-industry Grazing (Avg. Score: 1.00)

NJ Specific Threats: 2.3.3.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.3.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

3 Energy Production and Mining

3.1 Oil and Gas Facilities and Pipelines

3.1.1 Distribution processes of petroleum and other liquid hydrocarbons (Avg. Score: 2.00)

NJ Specific Threats: 3.1.1.1 Fragments terrestrial and aquatic habitats.

3.1.1.2 Loss, alteration and/or degradation of habitat.

3.1.1.3 Increased risk of oil spills.

3.1.1.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.

3.1.2 Natural gas distribution processes (Avg. Score: 2.00)

NJ Specific Threats: 3.1.2.1 Fragments terrestrial and aquatic habitats.

3.1.2.2 Loss, alteration and/or degradation of habitat.

3.1.2.3 Increased risk of gas leaks and explosions.

3.1.2.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.

3.2 Mining and Quarrying

3.2.2 Surface Mining - Rock Quarry (and sand quarries) (Avg. Score: 1.00)

NJ Specific Threats:

3.2.2.1 Fragments terrestrial and aquatic habitats.

3.2.2.2 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

3.2.2.3 Increased risk of vehicle strikes/mortality to wildlife.

3.3 Renewable Energy

3.3.1 Wind Power (Avg. Score: 1.00)

NJ Specific Threats:

3.3.1.2 Fragments terrestrial habitats.

3.3.1.3 Loss, alteration and/or degradation of habitat.

3.3.1.4 Increased commercial infrastructure.

3.3.2 Solar Power (Avg. Score: 1.00)

NJ Specific Threats:

3.3.2.1 Fragments terrestrial habitats.

3.3.2.2 Loss, alteration and/or degradation of habitat.

3.3.2.3 Increased commercial infrastructure.

3.4 Conventional Power Plants

3.4.0 Conventional Power Plants (Avg. Score: 1.00)

NJ Specific Threats:

3.4.0.2 Loss, alteration and/or degradation of habitat due to new or the expansion of current facilities.

3.4.0.3 Alteration of the temperature, pH and/or hydrology of aquatic ecosystems change plant communities and can harm wildlife and/or impact their behavior and survivorship.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats:

4.1.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species and inhibiting dispersal of non-volant animals, reducing gene flow.

4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.1.2 Movement of cars and other vehicles on roads and railroads (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats:

4.1.2.1 Increased vehicle traffic increases the risk of wildlife mortality from strikes.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads (Avg. Score: 2.00)

NJ Specific Threats:

4.2.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species, inhibiting dispersal of non-volant animals, reducing gene flow, and creating barriers to fish when service line-associated roads cross streams (e.g., bridges, culverts, fords, etc.).

4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

4.2.1.4 Lines that cross or run parallel to streams result in a loss or reduction of vegetated riparian buffers and streamside shading, affecting water quality and in-stream habitat for aquatic biota.

4.2.2 Management of rights-of-way or communication tower facilities and/or their associated access roads (Avg. Score: 2.00)

NJ Specific Threats: 4.2.2.1 Improper or poorly scheduled vegetation management can cause direct mortality to and may reduce productivity of wildlife.

5 Biological Resource Use

5.1 Hunting and Collecting Terrestrial Animals

5.1.1 Intentional Use (Avg. Score: 1.00)

NJ Specific Threats: 5.1.1.1 Illegal collection of wildlife can have detrimental impacts on populations.

5.1.2 Unintentional effects (Avg. Score: 1.00)

NJ Specific Threats: 5.1.2.2 Disruption of normal wildlife behavior.

5.2 Gathering Terrestrial Plants

5.2.3 Control (Avg. Score: 1.00)

NJ Specific Threats: 5.2.3.3 Removal of riparian or near-stream vegetation alters water quality and in-stream habitat for aquatic organisms by reducing streamside shading, increasing bank erosion, and affecting the natural filtering ability of trees, shrubs, and grasses.

5.3 Logging and Wood Harvesting

5.3.1 Intentional Use (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.1.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.1.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.1.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.1.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.1.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.2 Intentional Use (large scale) (Avg. Score: 2.00)

NJ Specific Threats: 5.3.2.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.2.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.2.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.2.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.2.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.3 Unintentional effects (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.3.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.3.2 Poorly planned/implemented tree harvesting adjacent to waterways and vernal pools can lead to increased water temperatures, soil erosion and sedimentation, and reduces the potential for woody debris within the aquatic system, leading to negative impacts on wildlife.

5.3.4 Unintentional effects (large scale) (Avg. Score: 2.00)

NJ Specific Threats: 5.3.4.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4.2 Extensive infrastructure and larger equipment requirements present a potential risk of direct injury/mortality to wildlife.

5.3.4.3 Poorly planned/implemented tree harvesting adjacent to waterways and vernal pools can lead to increased water temperatures, soil erosion and sedimentation, and reduces the potential for woody debris within the aquatic system, leading to negative impacts on wildlife.

5.3.4.4 Infrastructure and/or equipment use may result in subtle changes to drainage patterns, adversely affecting vernal pool and wetland hydrology.

5.3.4.5 Lack of appropriate, sustainable forest management can lead to a decrease in forest habitat diversity, degraded habitat for many forest species, the loss of habitat for early-successional species, and/or the loss of unique habitats for species that need canopy breaks and multi-aged tree composition to fulfill various life history requirements.

5.4 Fishing and Harvesting of Aquatic Resources

5.4.1 Intentional Use (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.4.1.4 Illegal collection of aquatic and semi-aquatic wildlife can have detrimental impacts on populations.

5.4.2 Intentional Use (large scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.4.2.4 Illegal collection of aquatic and semi-aquatic wildlife can have detrimental impacts on populations.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized) (Avg. Score: 1.00)

NJ Specific Threats: 6.1.1.1 Inappropriate use of off-road vehicles creates new roads/trails which fragments habitat.

6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.

6.1.1.3 Increased risk of harassment that results in a change in wildlife behavior and/or direct mortality from vehicle strikes.

6.1.1.6 Off-road vehicles can be a mechanism of transference of wildlife diseases and invasive plant species if gear and apparel are not properly sanitized between sites.

6.1.5 Wildlife observation and photography (Avg. Score: 1.00)

NJ Specific Threats: 6.1.5.1 Improperly conducted recreational activities may disrupt normal wildlife behaviors which can result in reduced reproductive success or survival, abandonment of critical sites, etc.

6.1.5.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.2 Military Exercises

6.2.1 Military exercises (Avg. Score: 1.00)

NJ Specific Threats: 6.2.1.1 Military testing and training exercises may inflict disturbance and potential physical harm to wildlife.

6.2.1.3 Lack of opportunity for non-federal wildlife managers to influence activities on military bases may result in detrimental impacts to SGCN and/or missed opportunities to engage in projects that benefit SGCN.

6.3 Work and Other Activities

6.3.1 Unauthorized research projects at significant habitats (Avg. Score: 2.00)

NJ Specific Threats: 6.3.1.1 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.1.2 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.2 Authorized research projects at significant habitats (Avg. Score: 2.00)

NJ Specific Threats: 6.3.2.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.2.3 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.3 Other "work" unrelated to research (Avg. Score: 1.00)

NJ Specific Threats: 6.3.3.1 Construction projects may disrupt normal wildlife behavior which can result in reduced reproductive success or survival, abandonment of critical sites, etc. (e.g., bridge-nesting birds).

6.3.3.4 Workers may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

7 Natural Systems Modifications

7.1 Fire and Fire Suppression

7.1.1 Increase in Fire Frequency/Intensity (Avg. Score: 1.00)

NJ Specific Threats: 7.1.1.1 Increase in frequency and intensity of wild fires as a result of droughts and heat waves drying out vegetation and litter.

7.1.1.2 Increase in frequency of wild fires as a result of illegal activities.

7.1.1.3 Unnatural fire regimes occurring as a result of military exercises.

7.1.2 Suppression of Fire Frequency/Intensity (Avg. Score: 1.00)

NJ Specific Threats: 7.1.2.1 Shift in vegetative communities as a result of suppression of natural fires.

7.2 Dams and Water Management/Use

7.2.1 Abstraction of Surface Water (domestic use) (Avg. Score: 2.00)

NJ Specific Threats: 7.2.1.1 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.1.2 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.1.3 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, and eliminates shallow water habitats.

7.2.1.5 Abstraction of surface water may deplete upland mesic habitats of water needed by plants and wildlife.

7.2.2 Abstraction of Surface Water (commercial use) (Avg. Score: 2.00)

NJ Specific Threats: 7.2.2.1 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, eliminates shallow water habitats, and disrupts/removes stream bottom habitat.

7.2.2.2 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.2.3 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.2.5 Abstraction of surface water may deplete upland mesic habitats of water needed by plants and wildlife.

7.2.3 Abstraction of Surface Water (agricultural use) (Avg. Score: 2.00)

NJ Specific Threats: 7.2.3.1 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.3.2 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, and eliminates shallow water habitats.

7.2.3.5 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.3.6 Abstraction of surface water may deplete upland mesic habitats of water needed by plants and wildlife.

7.2.5 Abstraction of Ground Water (domestic use) (Avg. Score: 2.00)

NJ Specific Threats: 7.2.5.1 Heavy withdrawal of ground water for domestic use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.6 Abstraction of Ground Water (commercial use) (Avg. Score: 2.00)

NJ Specific Threats: 7.2.6.1 Heavy withdrawal of ground water for industrial and commercial use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.7 Abstraction of Ground Water (agricultural use) (Avg. Score: 2.00)

NJ Specific Threats: 7.2.7.1 Heavy withdrawal of ground water for agricultural use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.9 Small Dams (Avg. Score: 3.00)

NJ Specific Threats: 7.2.9.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.9.3 Dams act as a barrier to movement, limiting the ability of aquatic or semi-aquatic wildlife to move safely between habitats.

7.2.10 Large Dams (Avg. Score: 3.00)

NJ Specific Threats: 7.2.10.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.10.3 Dams act as a barrier to movement, limiting the ability of aquatic or semi-aquatic wildlife to move safely between habitats.

7.2.11 Dams (size unknown) (Avg. Score: 3.00)

NJ Specific Threats: 7.2.11.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.11.3 Dams act as a barrier to movement, limiting the ability of aquatic or semi-aquatic wildlife to move safely between habitats.

7.2.12 Culverts (Avg. Score: 2.00)

NJ Specific Threats: 7.2.12.1 Improper design, placement, installation and maintenance of culverts and other stream crossing structures can impede or prevent the movements of terrestrial organisms and can restrict or limit stream flow, impeding the movement of aquatic organisms along riparian corridors.

7.2.13 Stream Burial (Avg. Score: 3.00)

NJ Specific Threats: 7.2.13.1 Eliminates riparian habitats.

7.2.13.2 Eliminates in-stream habitat and water resources for wildlife.

7.2.13.3 Alters the hydrology and quality of downstream aquatic and riparian habitats.

7.3 Other Ecosystem Modifications

7.3.2 Inappropriate timing of mowing (Avg. Score: 1.00)

NJ Specific Threats: 7.3.2.1 Increased risk of direct mortality and/or reduced productivity of wildlife, as well as reduced use by migrating species.

7.3.3 Removal of coarse woody debris (streams, forests, scrub-shrub habitats) (Avg. Score: 1.00)

NJ Specific Threats: 7.3.3.1 Decreases the available detritus that normally accumulates behind and within stream obstructions, minimizing or eliminating food sources and shelters for fishes, invertebrates and amphibians.

7.3.3.2 Decreases habitat and/or corridor suitability due to limited or absent shelter and foraging habitat.

7.3.3.3 Removal of dead trees (snags), large felled logs (i.e., those > 12" dbh), and other downed woody material diminishes nesting, roosting, and sheltering options for wildlife, and increases the ease at which deer can browse regenerating vegetation.

7.3.3.4 Decreases available basking, shelter, and foraging habitats.

7.3.5 Poor habitat management (Avg. Score: 1.00)

NJ Specific Threats: 7.3.5.1 Improper or poorly scheduled maintenance of man-made corridors (e.g., roadsides and medians) can cause direct mortality to and may reduce productivity of wildlife.

7.3.5.2 Shifting from natural vegetation to lawns can cause increased temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

7.3.5.3 Vegetation clearing removes terrestrial and riparian corridors for animal movement, shelter, and resting areas.

7.3.5.4 Vegetation clearing or inappropriate alteration adjacent to aquatic habitats threatens aquatic species by degrading habitat and water quality (altering temperature and dissolved oxygen, increasing siltation and desiccation, etc.).

7.3.5.5 Habitat management that alters or removes vegetation without implementing long-term management increases the risk of invasive and exotic plants establishing themselves, outcompeting native vegetation.

7.3.5.6 Habitat management, including that which occurs on public and private lands, that does not consider timing and species' behaviors can result in the direct mortality and/or alteration or loss of habitat.

7.3.5.7 Improperly planned habitat management and/or mitigation efforts along roadsides and within the medians can attract wildlife and increase the risk of vehicle strikes.

7.3.5.9 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, eliminates shallow water habitats, and disrupts/removes stream bottom habitat.

7.3.5.10 Ditching, draining and filling of marshes and wetlands eliminates habitat and degrades the remaining surrounding areas for wildlife.

7.3.5.12 Lack of diversity in age structure and composition of vegetation due to lack of natural disturbances and/or vegetation management.

7.3.5.14 Intentional felling and removal of dead standing trees or snags eliminates resting, nesting or feeding habitat, and precludes the snags eventual contribution to coarse woody debris and forest floor structure and habitat.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species (Avg. Score: 2.00)

NJ Specific Threats:

8.1.1.1 Displace or outcompete native species for resources.

8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.

8.1.1.3 Invasive, non-native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

8.1.1.4 Invasive, non-native animals increase the risk of predation on native animals and/or herbivory on native vegetation.

8.1.1.5 Invasive, non-native animals and plants increase the risk of introduction and transference of diseases

8.1.1.6 Invasive, non-native plants may create physical barriers for some species.

8.1.2 Invasive non-native aquatic animals (Avg. Score: 1.00)

NJ Specific Threats:

8.1.2.2 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminishing habitat suitability and reducing ecological integrity of natural communities, and may introduce disease into a population.

8.1.3 Invasive non-native aquatic plants (Avg. Score: 1.00)

NJ Specific Threats:

8.1.3.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.4 Invasive non-native terrestrial/wetland animals (Avg. Score: 1.00)

NJ Specific Threats:

8.1.4.1 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.4.2 Free-roaming and feral domestic animals such as cats and dogs causes direct mortality of wildlife and disturbance to wildlife breeding and resting areas.

8.1.5 Invasive non-native terrestrial/wetland plants (Avg. Score: 1.00)

NJ Specific Threats:

8.1.5.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.6 Invasive non-native fungal/bacterial diseases (Avg. Score: 2.00)

NJ Specific Threats: 8.1.6.1 The introduction of non-native fungal and bacterial diseases threatens native populations and ecosystems.

8.2 Problematic Native Species/Diseases

8.2.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.2.1.1 Overabundant native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

8.2.1.2 Invasive pathogens and insects may increase in range and abundance as limiting factors (such as temperature) are altered as a result of climate change.

8.2.1.3 Invasive, native species can out-compete non-invasive species for resources (food, light, shelter), leading to the demise of some species populations.

8.2.1.4 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.4 Problematic Species/Diseases of Unknown Origin

8.4.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.4.1.1 Non-native or poorly understood diseases and parasites could potentially impact native animals.

8.5 Viral/Prion-induced Diseases

8.5.1 Unspecified Species (Disease) (Avg. Score: 1.00)

NJ Specific Threats: 8.5.1.1 There is a large knowledge gap regarding the existence of, or potential for, other diseases impacting native wildlife.

8.5.2 Named Species (Disease) (Avg. Score: 1.00)

NJ Specific Threats: 8.5.2.1 Diseases such as West Nile Virus, arenavirus, sudden oak death, Avian Influenza, and snake fungal disease cause morbidity or mortality to native populations.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.1 Domestic and Urban Waste Water

9.1.1 Sewage (Avg. Score: 2.00)

NJ Specific Threats: 9.1.1.1 Degradation of aquatic and marine water quality and habitats by changing turbidity, flow and water chemistry.

9.1.1.2 Leads to increased eutrophication and algae blooms that result in oxygen depletion.

9.1.1.3 Contaminants in sewage treatment effluents and Combined Sewer Overflows can cause developmental and behavioral abnormalities and reproductive failure in wildlife.

9.1.2 Run-off (Avg. Score: 1.00)

NJ Specific Threats: 9.1.2.1 Chemical fertilizers and nutrient run-off changes the pH in streams and ponds and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.1.2.2 Contaminants degrade aquatic and marine water quality and can bioaccumulate in benthic organisms, threatening wildlife by causing developmental and behavioral abnormalities and reproductive failure.

9.1.2.3 Contaminants from road runoff (oil, sediment, salt, etc.) impact native vegetation and the species that rely upon them, degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2 Industrial and Military Effluents

9.2.1 Oil Spills (Avg. Score: 1.00)

NJ Specific Threats:

9.2.1.1 Oil spills render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.1.2 Oil spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.1.3 Oil spills cause external oiling of wildlife and ingestion of oil, both of which can injure or kill wildlife.

9.2.2 Seepage from Mining (Avg. Score: 1.00)

NJ Specific Threats:

9.2.2.1 Contaminants from mining degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2.3 Other (Avg. Score: 1.00)

NJ Specific Threats:

9.2.3.1 Point and nonpoint source pollution such as polychlorinated biphenyls (PCBs), pesticides, heavy metals, and endocrine disrupting compounds (EDC's) into freshwater and marine systems pose threats to wildlife through direct contact and/or ingestion, and to aquatic species and their predators through bioaccumulation, impacting the reproductive success and neurological function of many avian and fish species.

9.2.3.2 Chemical spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.3.3 Chemical spills may render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.4 Other: Hydrofracturing (Avg. Score: 1.00)

NJ Specific Threats:

9.2.4.1 Contaminants from hydrofracturing degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2.4.2 Uncontrolled effluents escaping from hydrofracturing facilities can cause injury to wildlife and alter normal behaviors.

9.2.5 Other: Industrial toxic settling ponds (Avg. Score: 1.00)

NJ Specific Threats:

9.2.5.1 Surficial or open industrial effluent ponds can cause injury or death to wildlife that become exposed through ingestion or submersion.

9.3 Agricultural and Forestry Effluents

9.3.1 Nutrient Loads (Avg. Score: 2.00)

NJ Specific Threats:

9.3.1.1 Chemical fertilizers and nutrient run-off changes the pH in streams, ponds and wetlands and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.3.1.2 Animal waste degrades terrestrial and aquatic habitats, especially streams, ponds and wetlands, resulting in eutrophication, which disrupts oxygen and nutrient balances, and causes injury and mortality to aquatic organisms.

9.3.1.4 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades wetland and aquatic habitats with runoff, increasing sediment and nutrient loads and pH.

9.3.1.5 Conversion of native forests to plantations degrades wetland and aquatic habitats through increased runoff.

9.3.2 Soil Erosion and Sedimentation (Avg. Score: 2.00)

NJ Specific Threats: 9.3.2.1 Soil erosion, sedimentation and destruction of streambanks and riparian buffers degrade waters making them unsuitable for riparian-dependent wildlife.

9.3.2.3 Conversion of native forests to plantations degrades wetland and aquatic habitats through increased sedimentation.

9.3.3 Herbicides and Pesticides (Avg. Score: 2.00)

NJ Specific Threats: 9.3.3.1 Pesticides degrade terrestrial and aquatic habitats, especially streams, ponds and wetlands. Aquatic wildlife are particularly sensitive to these contaminants, which can cause developmental and behavioral abnormalities and reproductive failure. Some contaminants may bioaccumulate in predatory fish and birds and disrupt reproduction.

9.3.3.3 Use of pesticides can directly harm non-target species through direct contact and/or by reducing and/or contaminating their food supply.

9.3.4 Other (Avg. Score: 2.00)

NJ Specific Threats: 9.3.4.1 Spills, leaks or discharges of fuel, oil or other contaminant fluids from machinery or equipment used in the normal course of agricultural or forestry activities can degrade or destroy adjacent aquatic and terrestrial habitats and/or cause harm to non-target species (plants and animals).

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture (Avg. Score: 2.00)

NJ Specific Threats: 9.3.5.1 Use of pesticides, insecticides, and/or herbicides can directly harm non-target species, such as amphibians and beneficial invertebrates through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5.4 Improper use of current insecticides, such as those containing esfenvalerate, prallethrin, or piperonyl butoxide, or past use of pesticides containing chlordane still present in the soils, are toxic to various wildlife species, and can cause injury, mortality, or other effects that impair population viability.

9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.4 Garbage and Solid Waste

9.4.1 Direct hazards to wildlife (Avg. Score: 1.00)

NJ Specific Threats: 9.4.1.2 Garbage and solid waste destroys natural habitats and obstructs wildlife movements.

9.5 Air-Bourne Pollutants

9.5.1 Acid Rain (Avg. Score: 2.00)

NJ Specific Threats: 9.5.1.1 Causes acidification of water bodies, resulting in changes to aquatic and marine communities and reducing biodiversity, and creating conditions that are unsuitable for some aquatic (freshwater and marine) and semi-aquatic species that are sensitive to pH shifts.

9.5.1.2 Leaches calcium from the soils which in turn reduces the availability of prey, particularly calcium-rich prey such as snails.

9.5.4 Other (Avg. Score: 1.00)

NJ Specific Threats: 9.5.4.1 Dust and/or airborne sedimentation from construction sites, agricultural operations or related earth disturbances can introduce mineral or organic sediments into adjacent wildlife habitats, degrading their quality and suitability for wildlife short-term and/or long-term.

9.5.6 Herbicides and Pesticides (Avg. Score: 2.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

9.6 Excess Energy

9.6.2 Thermal Pollution (Avg. Score: 1.00)

NJ Specific Threats: 9.6.2.2 Water temperature changes to aquatic systems can deter or preclude use by SGCN (e.g., alter habitat suitability for wildlife species, reduce prey base) or present stressors that are harmful if not fatal to wildlife.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 1.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.2 Droughts

11.2.1 Droughts (Avg. Score: 2.00)

NJ Specific Threats: 11.2.1.1 Contribute to hardened soils, decreasing water recharge during rains and increasing the likelihood of flash floods during storms.

11.2.1.2 Lead to lower groundwater levels and therefore, less available water for people and habitats.

11.2.1.3 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

11.2.1.6 Increased desiccation risk for amphibians and altered wetland hydrology for critical habitats including breeding pools.

11.3 Temperature Extremes

11.3.1 Temperature extremes (Avg. Score: 2.00)

NJ Specific Threats: 11.3.1.1 Increasing temperatures may cause habitat loss and degradation by desiccating and/or raising the temperatures of small wetlands and streams leading to the loss of freshwater mussels and other aquatic species and species reliant upon these habitats.

11.3.1.2 Increased temperatures can negatively impact wetland, riverine, lacustrine and vernal pool-associated or -dependent wildlife by reducing flows, increasing water temperatures, lowering water levels and causing premature drying of vernal habitats.

11.3.1.4 Extremely low temperatures and/or extensive periods of unseasonably low temperatures during critical life history stages (e.g., hibernation, gestation/nesting) can alter animals' behaviors and decrease survivorship.

11.4 Storms and Flooding

11.4.1 Storms and flooding (Avg. Score: 1.00)

NJ Specific Threats: 11.4.1.1 Extreme storms and flooding events threaten aquatic and marine wildlife through habitat degradation and alteration, including alterations to off-shore or back-bay benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic and marine wildlife.

11.4.1.4 Flood events alter river or stream morphology, benthic conditions and habitat availability for wildlife, cause bank erosion, and deposit sediments in floodplain wetlands altering wildlife habitat.

11.4.2 Increased rainfall (Avg. Score: 1.00)

NJ Specific Threats: 11.4.2.1 Extreme rain events threaten aquatic wildlife through habitat degradation and alteration, including alterations to benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic wildlife.

11.4.2.2 Extreme rain events can damage wildlife nesting and resting habitats, including impacts to avian eggs and chick and small mammal survivorship.

11.4.2.3 More frequent rain events can alter terrestrial and wetland vegetation communities as well as wetland hydrology, shifting wildlife community use.

11.6 Phenology Shifting or Alteration

11.6.2 Phenology shifts related to predator-prey ecology (Avg. Score: 1.00)

NJ Specific Threats: 11.6.2.1 Alters inter-specific relationships (e.g., competition, parasitism, predation) of wildlife, ultimately leads to detrimental impacts on the ecological system.

11.6.2.2 Shifts timing of species migration, breeding and hibernation, and available food resources, causes redistribution of species, or mortality for species that are unable to relocate due to their already isolated habitat or limited mobility.

11.6.3 Phenology shifts related to species redistribution (Avg. Score: 1.00)

NJ Specific Threats: 11.6.3.1 Shifts in timing of species migration, breeding and hibernation, and available food resources, as a result of wildlife range shifts driven by climate change.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 2.00)

NJ Specific Threats: 12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.2 Lack of up-to-date existing information (Avg. Score: 2.00)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.3 Need to answer research question (Avg. Score: 2.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.4 Need to develop new technique (Avg. Score: 2.00)

NJ Specific Threats: 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 1.00)

NJ Specific Threats: 12.3.0.6 Certain geographic or habitat features, such as vernal pools and headwater wetlands or streams, may be too small, mischaracterized, or misidentified to benefit from regulatory protection.

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 1.00)

NJ Specific Threats: 12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 2.00)

NJ Specific Threats:

14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 2.00)

NJ Specific Threats:

14.2.1.1 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various forest management practices.

14.2.1.2 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various aquatic and riparian management practices.

14.2.1.5 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various wetland management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 1.00)

NJ Specific Threats:

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.4 Secure and promote the protection, restoration, and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts through incentive programs.

1.2.1.5 Secure and promote the protection/restoration of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through incentive programs.

1.2.1.6 Secure and promote the protection/restoration of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers through incentive programs.

1.2.1.7 Secure and promote the protection/restoration of fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.12 Create incentives (non-monetary and/or monetary) for land developers to redevelop abandoned areas (e.g., shopping centers, office complexes) to minimize the loss of natural habitats and reduce the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.14 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of herbicides and pesticides, and implementing more ecologically safe strategies when using such products.

1.2.1.16 Create incentives (non-monetary and/or monetary) within State regulations (mitigations requirements or credit, BMP satisfaction, etc.) to promote the use of retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.18 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and land managers to control and reduce the impacts of invasive, native and non-native species in order to increase structural habitat diversity.

1.2.1.20 Coordinate across government agencies and non-government organizations to create or expand upon tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMP's.

1.2.1.23 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to provide cost shares and/or plan approvals for management based on management approaches and prescriptions.

1.2.1.25 Create incentives (non-monetary and/or monetary) within State regulations to assist and programs to deliver those incentives to aquaculture growers to relocate, for example, from intertidal to subtidal lease areas through buyouts of leases or microloans, and/or promoting on-lease conservation measures used by aquaculture growers (such as the implementation of conservation easements, use of living shorelines, incorporation of BMPs for habitat protection, etc.) for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

2 Direct Management of Natural Resources

2.2 Dam and barrier removal

2.2.1 Culvert work

2.2.1.1 Replace existing barriers to wildlife movement with and/or install appropriately-sized systems to accommodate wildlife dispersal.

2.3 Fire management

2.3.3 Prescribed burning

2.3.3.1 Evaluate different management techniques of prescribed burns that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

2.3.3.2 Conduct prescribed burning in Northern New Jersey forests to maintain and regenerate a mosaic of upland forest habitats.

2.3.3.3 Conduct prescribed burning to improve wildlife habitat.

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.5 Implement biologically safe and appropriate control/management strategies, and where appropriate, eradication strategies to reduce the impacts and/or limit the distribution of invasive and/or non-native plant species within or near aquatic systems using methods that will provide the most protection to the aquatic and riparian ecological system, and minimize disturbance to the soil and wildlife. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.8.0.6 Implement long-term management of invasive and/or non-native plants to help maintain functioning ecological systems and biological diversity, and to enhance travel corridors. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.4 Restore and/or enhance suitable travel corridors connecting conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.8 Protect significant natural and/or unique communities by implementing best management practices when conducting habitat restoration strategies.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.12 Create and/or maintain scrub-shrub habitats through revegetation efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.15 Restore and/or enhance terrestrial and aquatic habitats proximate to but not adjacent to roads and other transportation corridors for terrestrial-bound SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.10.0.21 Restore and/or enhance understory habitats that suppress invasive species and provide critical resources and enhance sheltering, foraging, and nesting cover for wildlife.

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.10.0.24 Use NJ's CHANJ mapping and guidance to establish vegetation and enhance or create corridors between fragmented habitats with similar vegetation, slope, soils, structure, etc. to ensure vegetative integrity is maintained to allow wildlife to safely disperse, and corridors are buffered with natural habitats to minimize disturbance to wildlife within the corridors.

2.10.0.25 Enhance SGCN fish habitats through aquatic and riparian vegetation restoration.

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.11.0.3 Create suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats through vegetation management.

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through vegetation management.

2.11.0.6 Reclaim degraded rare species habitats by conducting vegetation management needed to restore habitat value for the documented/target SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.8 Maintain, enhance and/or restore biologically appropriate buffers for SGCN-inhabited/used freshwater wetlands through vegetation management.

2.11.0.13 Implement best management practices (BMPs), protective strategies, and guidelines for vegetation management to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.11.0.14 Conduct vegetation management adjacent to roads for SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.11.0.16 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.11.0.18 Implement forest management/silvicultural strategies that promote the development of new old-growth forests and/or minimize the loss of old-growth forest stands with large trees and within large, contiguous tracts.

2.11.0.20 Create and/or maintain scrub-shrub habitats through management efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.11.0.21 Minimize the degradation, alteration and/or changes in hydrology of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and subsequent disturbances to and behavioral changes of wildlife by maintaining or enhancing these areas and biologically appropriate buffers through habitat management and/or revegetation or restoration efforts.

2.11.0.23 Implement appropriate habitat management actions in areas where natural disturbances, such as wildfire, have been precluded.

2.11.0.24 Conduct vegetation management adjacent to aquatic habitats following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.25 Conduct vegetation management along access roads following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.26 Conduct vegetation management along roadsides and medians, avoiding peak activity periods for wildlife, that enhances wildlife dispersal naturally and safely across roads and similar barriers to/between terrestrial and/or aquatic habitats.

2.11.0.27 Conduct vegetation management for target shrub- or young forest-dependent SGCN following BMPs to minimize the risk of the establishment of invasive and non-native plants.

2.11.0.28 Conduct vegetation management in agricultural areas following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.29 Conduct vegetation management on transportation and service corridors (i.e., rights-of-way) following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.31 In areas where vegetative communities are shifting due to fire suppression and controlled burns are not feasible, manage vegetation to improve wildlife habitat.

2.11.0.32 Increase structural habitat diversity around and when feasible, within agricultural landscapes by managing vegetation for a variety of species, in particular, those farms that have removed scrub-shrub habitat and/or fragmented forests, and by implementing ecologically best practices (e.g., no-till farming, maintaining hedgerows, buffer set-asides, etc.).

2.11.0.33 Increase structural habitat diversity by implementing long-term vegetation management to minimize the potential for the establishment of invasive and/or non-native plants that may outcompete native vegetation.

2.11.0.34 Increase structural habitat diversity by managing residential, commercial and recreational areas' landscapes for a variety of species. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.35 Increase structural habitat diversity by managing vegetation adjacent to aquatic habitats in a manner that provides a buffer from runoff and erosion and a microclimate to stabilize seasonal temperatures to benefit a variety of aquatic and semi-aquatic species.

2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.

2.11.0.37 Increase structural habitat diversity by minimizing the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats which benefits wildlife.

2.11.0.38 Increase structural habitat diversity in and around horse/livestock farms by managing vegetation for a variety of species, in particular, in and around farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

2.11.0.39 Increase structural habitat diversity in and around solar farms by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.40 Increase structural habitat diversity surrounding areas used for energy, mining, and transportation and service corridors by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides, and avoid managing habitat during the breeding seasons for ground-nesting birds, reptiles, amphibians and small mammals.

2.11.0.41 Increase structural habitat diversity through the implementation of a variety of vegetation management practices such a prescribed burns (either increasing or decreasing their frequency depending on the site and objective), plantings, etc. that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.42 Increase structural habitat diversity within wind farms for terrestrial bound and low-flying species and around wind farms for other wildlife by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.43 Manage forests to increase variation in age structure and composition using BMPs that promote and maintain functioning ecological forest-based systems and biological diversity.

2.11.0.45 Regularly and/or rotationally create young forest habitat in targeted areas to maintain and regenerate a mosaic of upland forest habitats that will benefit shrub- and young forest-dependent species.

2.13 Wildlife damage management

2.13.0 Nuisance fish and wildlife damage

2.13.0.8 Implement and assess management strategies to control and reduce the impacts of detrimental species and diseases that pose threats to native wildlife or communities.

2.14 Wildlife disease management

2.14.0 Wildlife disease strategy development and investigation

2.14.0.1 Investigate diseases/pathogens impacting SGCN and/or their habitats.

2.14.0.2 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

2.14.0.3 Protect SGCN from exotic pathogen introduction or incident through implementation of a "rapid response plan"; DFW to give priority attention to these species in planning and/or implementing a response.

2.14.0.4 Conduct long-term monitoring of diseases in vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts.

2.14.0.5 Assess the impacts of diseases on the life cycles of wildlife.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.6 Conduct long-term studies on resident and migratory SGCN to determine if there are changes to the populations' demography (productivity, survival, dispersal) and/or to their critical and/or supporting habitats (i.e., diminishing in value, acreage or connectivity, etc.), in particular changes that would not maintain SGCN at viable levels for species populations. Update data and GIS maps; provide updated information to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.9 Identify SGCN (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources, and compile/collect and evaluate data/information regarding potential management strategies to improve the availability of such SGCN's food resources.

3.0.0.10 Conduct long-term studies to evaluate the effectiveness of management strategies implemented to enhance food/prey availability for SGCN [whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources] through studies that investigate the populations and health of the food resources as well as the target SGCN. Revise management strategies as needed and continue to monitor the effectiveness of the efforts.

3.0.0.11 Develop, implement and evaluate the effectiveness of town plans that avoid impacts to SGCN species and their habitats.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.14 Identify areas with invasive, aquatic plants and animals and collect a detailed baseline assessment of the species' status and distribution. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort. Researchers and contractors performing Forest Stewardship Inventories and/or Plans on state lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.0.0.19 Identify the presence and status (e.g., functioning, structure, slated for removal, etc.) of existing dams and culverts within and/or that may impact SGCN and their habitats, and create a database that includes a GIS component identifying the locations of such structures and their status. Share this information with appropriate organizations and/or agencies evaluating the benefits and risks of such structures on SGCN and their habitats.

3.0.0.20 Once baseline data identifying and describing the status of existing dams and culverts have been gathered, conduct evaluations at a variety of sites to determine whether the benefits of culvert and dam creation or removal outweigh the risks to SGCN species and their habitats, and if other variables/conditions specific to individual sites/locations result in a different outcome. Identify and target appropriate dams and culverts for removal and/or reconstruction to minimize harm to SGCN species and their habitats.

3.0.0.22 Develop, implement and evaluate the success of a habitat improvement and restoration program to restore cold-water fish habitat, ecosystems and populations.

3.0.0.23 Identify (through wildlife and aquatic system surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and research water quality parameters for all [types of] aquatic systems for various SGCN populations.

3.0.0.24 Identify (through aerial and topographic maps), and confirm through field surveys, potential vernal pools using standard protocols. Provide confirmed vernal pool locations (and when possible, a description of the pools condition) and species' presence data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.26 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species including objectives and guidance pertaining to and the condition/status of critical and supporting habitats.

3.0.0.27 Evaluate the effectiveness of strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals through research and monitoring. Develop and provide NJ DEP and other appropriate governing agencies/commissions a summary of findings and recommendations to improve such efforts.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.2 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.0.3 Survey for and monitor populations of freshwater aquatic focal SGCN to assess the populations' demography, trends, condition, distribution, etc.

3.2.0.4 Conduct long-term monitoring of the impacts of contaminants to vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.2.0.5 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

3.2.0.6 Develop, implement and conduct studies to evaluate the effectiveness of methods implemented to reduce road mortality of wildlife (e.g. wildlife underpasses, road closures).

3.2.0.7 Track (via a database that includes a GIS component) and research problematic species and diseases to determine their distribution, impacts on SGCN wildlife/wildlife communities, and develop potential control measures.

3.2.0.8 Implement and conduct long-term monitoring of control measures aimed at minimizing the impacts of problematic species and/or diseases to evaluate the effectiveness of such efforts and to identify and incorporate additional strategies as appropriate.

3.2.0.10 Evaluate the effectiveness of sanitation/decontamination protocols in minimizing the transference of wildlife diseases and invasive plant species.

3.2.0.11 Investigate the impacts of ORV use as a mechanism to spread wildlife diseases and invasive plant species to native wildlife and habitats. Integrate this information when mapping undeveloped roads and trails to identify potentially sensitive areas in northern NJ forests.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.2 Age, size and sex structure

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.3 Baseline inventory

3.2.3.7 Identify roads or portions of roads, paved or unimproved (through site surveys, land use/land cover assessments and analyses, review of available data, enlistment of species experts, etc.) with high incidences of road mortality and/or presence of snakes, turtles, medium-sized and large mammals. Conduct assessments of the roads and incorporate information into a database that includes descriptions (e.g., qualifiers to help prioritize the roads' risk to wildlife) and a GIS component of the locations of such areas. Share this information with appropriate organizations and/or agencies working to implement measures (e.g., wildlife passages, road closures) to minimize the risk to these species.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.6 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) that could, through revegetation and/or enhancement efforts, become suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN.

3.3.1.7 Map and prioritize existing and potential areas for early succession forest management. Share the results with state, county and municipal planners.

3.3.1.8 Assess the availability and suitability of forest habitats for SGCN species (particularly reptiles and amphibians, birds, pollinators, and tiger beetles) in southern forests since Superstorm Sandy.

3.3.1.17 Identify and map undeveloped roads and trails in all conserved forests, and create a database of locations. Integrate information regarding potentially sensitive areas.

3.3.1.18 Conduct an assessment using available data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels.

3.3.1.19 Identify and codify legal ORV access areas on state (and if appropriate, other conserved) lands. Provide GIS mapping to the landowner for potential use in directing such recreational activities.

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.2 Monitoring

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.4 Protect water quality and aquatic-dependent species by appropriately designating Category 1 waters and enforcing protective regulations. Seek appropriate classifications for stream segments based on Endangered and Threatened Status and/or the Index of Biotic Integrity (IBI) results that do not fulfill Category One requirements.

3.3.2.5 Conduct long-term monitoring of water quality of SGCN aquatic habitats (and aquatic systems feeding into those habitats) to evaluate protection and management efforts to reduce, if not eliminate, chemical contamination, siltation, eutrophication, and other forms of pollution/contamination of aquatic systems.

3.3.2.9 Investigate the effectiveness of various silviculture techniques for enhancing forests for forest-dependent SGCN.

3.3.2.10 Evaluate the efficacy and success of different management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.3.2.13 Evaluate the effectiveness of management strategies (e.g., timing restrictions for mowing, cooperative agreements with utility companies for maintenance of rights-of-ways) that maintain and enhance large existing areas of grassland in perpetuity. Focus on habitat patches that can be managed to enhance the total size of suitable grassland habitat and create interspersed early-successional habitat.

3.3.2.14 Research and evaluate the effectiveness of water quality management practices on water-dependent and semi-dependent SGCN, particularly those practices associated with permitting or mitigation actions.

3.3.2.15 Investigate the effectiveness of management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.3 Develop/improve management techniques that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.8 Develop best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5.3.9 Develop strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.14 Develop aquaculture practices in the coastal areas that are compatible with the recovery of SGCN.

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.3.16 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.3.20 Develop guidance on various silviculture techniques for enhancing forests for forest-dependent SGCN.

3.5.3.21 Develop management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.22 Identify (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) and modify management strategies (e.g., timing restrictions for mowing, cooperative agreements with utility companies for maintenance of rights-of-ways), based on research, that maintain and enhance large existing areas of grassland in perpetuity.

3.5.3.23 Revise water quality management practices based on research on water-dependent and semi-dependent SGCN, particularly when associated with permitting or mitigation actions.

3.5.3.24 Based on research, modify management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.1 Develop studies to evaluate management strategies to improve the availability of prey/food resources for SGCN whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources. Monitor and investigate the management strategies over time to determine success and/or the need to revise methods.

3.5.4.2 Develop, implement, monitor and evaluate management strategies to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

3.5.4.5 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

3.5.4.9 Conduct studies to evaluate the impacts of roads on SGCN and develop, implement and conduct studies to evaluate the effectiveness of methods to reduce road mortality of wildlife (e.g. wildlife underpasses, road closures).

3.5.4.13 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.17 Investigate new, non-invasive techniques for SGCN population evaluation through literature review, expert opinion, trial studies (if low risk), etc.

3.5.4.18 Investigate the effectiveness of survey techniques through selected “ground truthing” and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

3.5.4.21 Develop BMPs to address problematic species and diseases of unknown origin.

3.5.4.22 Investigate the efficacy of implementing strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities.

5 Facilities and Areas

5.15 Wildlife Management Areas

5.15.6 Roads

5.15.6.1 Clearly post areas/roads where vehicle access is permitted.

5.15.6.2 Clearly post areas/trails where vehicle access is not permitted.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.3 Secure and protect riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.4 Secure and protect fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.6 Secure and protect old-growth forest stands with large trees and/or stands that are approaching or being actively managed for old growth forests, in particular those within large, contiguous forest tracts, through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.7 Secure and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.8 Secure and protect scrub-shrub habitats for SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.3 Increase the protection of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through conservation area designations.

6.3.0.6 Promote the protection of old-growth forest stands with large trees and/or stands that are approaching or being actively managed for old growth forests, in particular those within large, contiguous forest tracts, through conservation area designations.

6.3.0.7 Promote the protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through conservation area designations.

6.3.0.8 Promote the protection of scrub-shrub habitats for SGCN through conservation area designations.

6.4 Private lands agreements

6.4.0 Private land agreement strategies

6.4.0.1 Enter into private lands agreements to expand control burns on private lands, in particular those adjacent to conserved lands to improve SGCN habitats.

7 Law Enforcement

7.1 Law enforcement

7.1.3 Sub-national Level

7.1.3.2 Increase the number of law enforcement officers tending to wildlife issues to a reasonable number to sufficiently cover the State and marine waters.

7.1.4 Scale Unspecified

7.1.4.1 Improve enforcement of policies and/or regulations that promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

7.1.4.3 Increase law enforcement presence proximate to sensitive areas [e.g., avian nesting sites, in particular rookeries, and reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively)] to deter human activity and subsequent disturbance to SGCN.

7.1.4.6 Recruit law enforcement to assist in the protection and enhancement of SGCN populations, in particular endangered species, through improved awareness of species through trainings, partnerships, and other methods. Information should include but is not limited to: 1) Issues concerning illegal collection of reptiles, 2) Persecution of rare snakes, 3) Illegal recreational activities on public lands (e.g., off-road vehicles) and their impact on wildlife, 4) Identification of sensitive areas, critical sites and/or "hot-spots" for collection.

7.1.4.7 Increase law enforcement presence to enforce regulations governing recreational activities (e.g., the use of personal watercraft and off road vehicles, caving, rock climbing, etc.) on conserved lands and within other sensitive habitats, and discourage activities that cause harm or disturbance to vegetation, wetlands, fish and wildlife.

7.1.4.9 Implement policies that improve and secure habitat connections between conserved SGCN habitats.

7.1.4.10 Implement policies that promotes expanding acreages and enhances the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.14 Implement policies that protect existing and developing old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

7.1.4.15 Implement policies that preserve and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

7.1.4.16 Implement policies that protect and restore riparian areas.

7.1.4.17 Improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

7.1.4.19 Implement policies that protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

7.1.4.23 Implement policies that minimize wildlife road mortality.

7.1.4.26 Educate law enforcement personnel that there may be unauthorized research projects taking place and to encourage them to investigate any activities that appear to be harmful to wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.1.0.4 Engage government agencies, conservation partners and other stakeholders in constructive dialogues encouraging them to influence policy change and the creation of incentives through a habitat bill and/or municipal ordinances for backyard habitat.

8.1.0.6 Engage government agencies, conservation partners and other stakeholders in discussions focused on sharing information regarding coastal and marine critical wildlife habitats, developing comprehensive mapping to assist in reducing impacts of energy production activities, and establishing a long-term monitoring program to update the data. Ensure this information is available to appropriate personnel for planning or response measures.

8.1.0.11 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting sportsmen's organizations and fisheries, as well as public constituents, addressing the unintended effects abandoned fishing gear, tackle and crab pots can have on wildlife, and promote the collection and/or reporting of abandoned items and their locations.

8.1.0.12 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting sportsmen's organizations and fisheries, as well as public constituents, addressing the unintended effects fishing gear and tackle can have on wildlife.

8.1.0.13 Engage DOD in a constructive dialogue regarding strategies to minimize disturbances to all SGCN (i.e., beyond their federal requirements) from forest management and other practices on their lands.

8.1.0.14 Engage DOD in a constructive dialogue regarding strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities.

8.1.0.15 Engage government agencies, conservation partners and other stakeholders in discussions encouraging and supporting the creation of laws and policies requiring vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

8.1.0.16 Engage local governments in discussions regarding the importance of them adopting/passing ordinances which require assessing and addressing secondary impacts (i.e., ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

8.1.0.17 Engage municipalities in constructive dialogue to identify and minimize destruction of areas prioritized for early succession forest management.

8.1.0.18 Engage NJDOT, NJ Transit Authority and other road management entities, wildlife conservation organizations/agencies (e.g., Division of Fish and Wildlife, New Jersey Conservation Foundation, Conserve Wildlife Foundation of NJ), and communities and citizens in discussions regarding the importance of and methods to enhance habitat connectivity, and work together to develop feasible strategies for ensuring that wildlife can disperse naturally and safely across roads and similar barriers to terrestrial and/or aquatic habitats.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.21 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation human-subsidized and/or overabundant, native species cause to local nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.22 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation invasive species cause to native nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.26 Coordinate across federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to woodland landowners to adopt or endorse consistent best management practices concerning controlled burns to maintain and/or improve forested habitat for wildlife.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.32 Work with NJ DEP's Water Management, other state agencies and watershed organizations to determine if mitigation is warranted at applicable power plants.

8.1.0.33 Engage government agencies, conservation partners and other land managers, communities, landowners, and commercial and industrial stakeholders in discussions regarding the importance of protecting and methods to protect priority wetlands beyond the levels afforded through regulation by maintaining and/or restoring optimal biological buffers around wetlands.

8.1.0.34 Work with the NJ Education Association and Department of Education to design curriculum and outdoor experimental learning opportunities, and provide training to teachers on implementation of these activities.

8.1.0.37 Enlist landowners and NJ citizens in the protection of and survey efforts for SGCN, in particular rare species, by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management and wildlife-related volunteer programs.

8.1.0.38 Engage partners, stakeholders and land managers in constructive dialogue promoting forest stewardship for SGCN that use core forests and forested corridors.

8.1.0.40 Encourage researchers, land managers, naturalists and enthusiasts to follow proper procedures for the coordination and/or permitting of research/management activities involving wildlife and sensitive habitats, and discourage activities that alter vegetation or wetlands, or cause harm or disturbance to wildlife.

8.1.0.42 Engage citizens, wildlife observers and photographers through discussions and distributable information regarding the importance of and encouraging implementing responsible and ethical behavior when observing wildlife by developing an alliance of wildlife photographers and widely circulating recommendations on how to reduce impact.

8.1.0.44 Engage conservation partners, stakeholders, government agencies and other land stewards in constructive dialogues encouraging their inclusion of controlled burns in forest and other stewardship plans.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.7 Develop and provide (or otherwise make publicly available) educational programs and/or materials that describe the negative impacts of off-road vehicles and watercraft use in and adjacent to critical SGCN habitats, and the importance of confining such activities to more appropriate locations and/or seasons.

8.3.0.8 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate recreationists and encourage landowners to eliminate garbage in the vicinity of suitable wildlife habitat, in particular SGCN habitat. Information should include the detrimental impacts garbage may have on various wildlife species.

8.3.0.9 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners and land managers to include only native plants in landscaping and restoration projects. Provide information to assist them in detecting problematic establishment of invasive, non-indigenous plants.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.15 Develop an educational outreach program for citizens regarding: 1) The impacts to wildlife as a result of plastic bags entering aquatic and marine systems, 2) The importance of decreasing the amount of plastic shopping bags in circulation, 3) The need for businesses to voluntarily charge for bags or reimburse people for using their own non-plastic bags, and 4) The need for their assistance through public pressure on legislators and government to pass legislation that that limits the amount of plastic shopping bags in circulation.

8.3.0.19 Develop an educational outreach program for the public on the devastating effects predators can have on native nesting wildlife.

8.3.0.24 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

8.3.0.25 Develop educational outreach programs for landowners, nurseries and the general public regarding the negative impacts of invasive and non-native plants on our natural communities.

8.3.0.26 Develop educational outreach programs for private and public landowners and land managers regarding the importance of and how to manage core forests and forested corridors in a way that will be beneficial for SGCN, particularly endangered, threatened and special concern species.

8.3.0.27 Develop educational outreach programs for public and private landowners and land managers regarding the importance of structural habitat diversity, methods to increase diversity, and/or incentive programs available to increase habitat diversity.

8.3.0.29 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about the importance of maintaining a vegetative buffer along riparian and aquatic habitats to intercept storm water runoff and minimize soil erosion.

8.3.0.30 Develop educational outreach programs for private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.5 Develop a plan that directs the creation or expansion of energy or utility rights-of-way in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.6 Develop a plan that directs the creation or expansion of roads and railroads or the re-establishment of abandoned railroads within and adjacent to critical forested habitats in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.7 Develop a plan that directs the maintenance of or new channelization of forested streams and rivers in a manner that minimizes impacts of the aquatic ecological system and adjacent forest

9.1.0.8 Develop a plan that focuses on strategies for oil pipelines to avoid sensitive habitats that would be highly impacted by oil spills.

9.1.0.9 Develop a plan that focuses on strategies to minimize the creation of renewable energy farms (e.g., solar, wind) and related infrastructures within and their impacts on forested habitats and the wildlife community.

9.1.0.10 Develop a plan that focuses on strategies to minimize the impacts of mining on critical forested habitats.

9.1.0.11 Develop a plan that focuses on strategies to minimize the impacts of power plants on critical forested habitats and the wildlife community.

9.1.0.13 Develop a plan to minimize agriculture that would result in groundwater withdrawal in critical forested areas.

9.1.0.14 Develop a plan to minimize development that would result in groundwater withdrawal in critical forested areas.

9.1.0.15 Develop a plan to minimize fragmentation of terrestrial and aquatic habitats by roads.

9.1.0.16 Develop a plan to minimize new lawnscapes and preserve natural vegetation within and adjacent to critical forest areas.

9.1.0.17 Develop a plan to minimize nutrient and effluent loads from aquaculture practices.

9.1.0.18 Develop a plan to minimize the effects of road widening and traffic volume increases within critical wildlife habitat areas using CHANJ products.

9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

9.1.0.20 Develop a plan to minimize the impacts of existing agricultural properties adjacent to and the conversion of forest habitats (terrestrial and aquatic, within or adjacent to critical forests) to agriculture, grazing areas/livestock farms, and plantations.

9.1.0.21 Develop a plan to minimize the use of any-sized dam in critical forested areas.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.23 Develop a plan to mitigate the effects of transportation barriers by using CHANJ products.

9.1.0.24 Develop a plan to prevent livestock from entering water bodies in critical forested habitats.

9.1.0.25 Develop a plan to prevent the conversion of forested stream buffers to pastures in critical forested habitats.

9.1.0.27 Develop a plan to use wildlife-appropriate culverts in critical forested areas.

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.31 Develop wetland restoration plans that consider the life history and needs of wildlife occupying targeted habitats.

9.1.0.32 Incorporate aquatic habitat connectivity and water quality/effluent standards into local and state aquaculture plans and BMPs.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.2 Organizational strategic and CMS planning

9.2.1 Organizational strategic and operational planning

9.2.1.1 Identify and codify legal ORV access areas on state lands.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.5 Develop response plans to address disease outbreaks within wildlife populations, in particular SGCN.

9.3.1.7 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.10 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.14 Create species management plans that will promote the protection and where appropriate, the development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

9.3.1.16 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.2 Listed species recovery planning

9.3.2.1 Develop proactive species recovery plans for all endangered and threatened species including guidance and objectives pertaining to critical and supporting habitat to meet and maintain recovery goals.

9.3.3 Habitat management planning

9.3.3.6 Develop a management plan for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

9.3.3.7 Develop a management plan to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

9.3.3.8 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.3.9 Develop a response plan to outbreaks using BMPs to control infestations and limit their spread in a way that avoids excessive harm to non-target species.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.16 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.21 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.3.22 Create management plans to minimize and/or prevent wildlife road mortality that will incorporate wildlife passages in conjunction with barrier fencing and, where possible, seasonal closures. Aquatic-associated passages must avoid disturbance to the natural streambeds and riparian habitat, permit high volumes of water to flow freely, and provide adequate travel corridors for terrestrial wildlife, while maintaining stream flow for fish passage. Bridges that span rivers and streambeds and include floodplain habitat on either side of the span to provide travel corridors for terrestrial wildlife are preferred over culverts.

9.3.3.23 Create forest management plans that will promote the protection and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

9.3.3.24 Develop a plan to improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

9.3.3.27 Develop a management plan to expand breeding habitat and connectivity for tiger salamanders and other obligate vernal pool breeders.

9.3.3.29 Develop habitat management plans aimed at reducing or eliminating negative impacts of ORVs.

9.3.3.32 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3.34 Include controlled burn prescriptions in forest and stewardship plans to improve wildlife habitat.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.3 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.9 Review strategies for creating or enhancing connectivity (e.g., installing appropriately-sized wildlife passages) between wetlands to allow wildlife to disperse naturally and safely.

11.1.1.10 Use CHANJ mapping in reviews of proposed energy, mining, transportation and utility service companies/agencies' projects to attempt to maintain habitat connectivity and reduce fragmentation, and identify potential impacts of the projects.

11.1.1.11 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed offshore energy projects relating to drilling, extraction and distribution of petroleum and gas products to reduce habitat destruction and minimize impacts on wildlife.

11.1.1.12 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed solar farm projects to reduce habitat fragmentation and minimize impacts on wildlife.

11.1.1.13 Use the best available science (species data, habitat present, wind farm layout options, wind blade impacts on migratory species, location of migration routes, etc.) when conducting regulatory reviews of proposed wind farm projects to minimize impacts on migratory and resident wildlife and reduce habitat fragmentation.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.2.2 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.2.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into the environmental review process to help establish policies and plans that minimize the impact of aquaculture on fish and wildlife.

11.1.2.4 Review strategies for creating or enhancing connectivity (e.g., installing appropriately-sized wildlife passages) between wetlands to allow wildlife to disperse naturally and safely.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.2 Provide technical support to public and private landowners and land managers for controlling invasive, native and non-native plant species in order to increase structural habitat diversity.

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.7 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on the importance of maintaining habitat connectivity, minimizing fragmentation, and the use of CHANJ products to help them target areas for such planning.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.11 Provide educational resources, training programs, and on-the-ground guidance to private and public landowners and land managers on the benefits of and for creating young forest and early succession habitat for SGCN.

11.2.0.12 Provide educational resources and technical support to public landowners and land managers for managing grasslands for grassland-dependent species.

11.2.0.13 Provide educational resources and technical support to public landowners, private landowners with sufficient acreage, and land managers to promote the protection and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

11.2.0.14 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters), and to enhance or restore biologically appropriate buffers.

11.2.0.15 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and landowners about the importance of retaining and in an effort to protect, create, enhance and/or restore vegetation along aquatic habitats.

11.2.0.16 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

11.2.0.18 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats.

11.2.0.19 Provide educational resources and technical support to public and private landowners and land managers to promote the protection and/or enhancement of scrub-shrub habitats for SGCN.

11.2.0.22 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

11.2.0.23 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to SGCN habitats to promote the protection and/or enhancement of those adjacent habitats to increase the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and that connect conserved SGCN habitats.

11.2.0.24 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers on how to manage vegetated roadside areas (e.g., mowing, brush-hogging, etc.) on a schedule that avoids peak activity periods for wildlife and therefore, minimizes harm.

11.2.0.25 Provide educational resources, training programs, and on-the-ground guidance to resource managers regarding the assessment of and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) related to residential and commercial development.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.1 Engage partners and stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.3 Provide educational resources, training programs, and on-the-ground guidance to DOD to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop and implement forest management and other practices that minimize disturbances to SGCN (i.e., beyond their federal requirements).

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

11.2.2 With private landowners

11.2.2.1 Provide technical support to farming operations and woodland landowners on ways to decrease clean farming (edge-to-edge) practices and create ecotones to benefit bobwhite and other species dependent on early successional habitat.

100 Law and Policy

100. Legislation

100.1.3 Sub-national Level

100.1.3.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.3.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.4 County and Local

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.3 Expand the acreages and enhance the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN through local ordinances.

100.1.4.4 Secure wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and biologically appropriate buffers through local ordinances.

100.1.4.5 Secure SGCN-inhabited/used freshwater wetlands and biologically appropriate buffers through local ordinances.

100.1.4.7 Secure vernal pools and biologically appropriate buffers through local ordinances.

100.1.4.9 Secure existing and developing old-growth forest stands with large trees, in particular those within large, contiguous forest tracts, through local ordinances.

100.1.4.10 Secure critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through local ordinances.

100.1.4.11 Secure riparian areas through local ordinances.

100.1.4.12 Secure scrub-shrub habitats for SGCN through local ordinances.

100.1.4.13 Encourage municipal laws regulating domestic pets that may predate on wildlife.

100.1.4.14 Adopt/pass local ordinances which require assessing and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.5.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.5.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into state/local policy to minimize the impact of aquaculture on fish and wildlife.

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.1 Develop (and/or improve) policies and/or regulations that will promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

100.3.0.5 Develop policies that will promote improved and secure habitat connections between conserved SGCN habitats.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.11 Develop policies that will ensure the protection and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

100.3.0.12 Develop policies that promote the preservation and protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.13 Develop policies that will promote protecting and restoring riparian areas.

100.3.0.14 Develop policies and/or regulations that increase the protective buffers of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) to biologically appropriate distances to benefit SGCN that rely upon these habitats and improve the function of the [associated] aquatic systems.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.20 Develop policies and/or regulations that prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

100.3.0.21 Develop policies that minimize wildlife road mortality through: 1) Requiring the integration of wildlife passages into all new and repaired roads, in particular those areas that will connect SGCN habitats, 2) Requiring current fish/wildlife passages be improved and maintained in perpetuity, 3) Supporting seasonal road closures, in particular for unimproved roads, 4) Supporting projects that work to improve connectivity of SGCN habitats such as land conservation through acquisition or other means.

100.3.0.26 Adopt regulations requiring the combined sewer overflow alternative analyses required by regulation address potential impacts to wildlife in watercourses or receiving water bodies.

100.3.0.31 Create or expand tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMPs.

100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.

100.3.0.42 Fully adopt the former Storm water Management Rules' 300ft buffer requirements into the Flood Hazard Area Control Act Rules.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.45 Increase the controlled burn season to focus on restoring vegetative communities.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.48 Propose new State law or regulation mandating that a State-level "development impact fee" be assessed on all new development approved by municipalities (via the Municipal Land Use Law processes), and dedicate such monies to the development and implementation of regional Habitat Conservation Plans (or existing plans/programs serving the same regional function).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.53 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded rights-of-way corridors associated with energy transport/transmission.

100.3.0.57 Develop regulations that when implemented will improve and secure habitat connections between conserved SGCN habitats.

100.3.0.58 Develop regulations that when implemented will promote the expansion of acreages and enhancement of the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.62 Develop regulations that when implemented will protect existing old-growth forest stands with large trees and/or stands that are being actively managed for old growth forests, in particular those within large, contiguous forest tracts.

100.3.0.63 Develop regulations that when implemented will preserve and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.64 Develop regulations that when implemented will protect and restore riparian areas.

100.3.0.65 Develop regulations that when implemented will protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

100.3.0.67 Develop regulations for lighting of/on tall structures that will minimize harm to and/or disorientation of wildlife, and enforce within state, county and local permitting processes.

100.3.0.68 Develop regulations that when implemented will prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

100.3.0.69 Develop regulations that when implemented will minimize wildlife road mortality.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.2 Create a policy that requires the NJ DEP to incorporate scientific information regarding climate change and sea level rise (e.g., predictions, habitat management/acquisition efforts to enhance resilience to inundation) on their websites and to work with other government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

100.4.0.4 Create a policy that requires the use of wildlife habitat and corridor mapping products for both regulatory use when conducting project reviews and planning/siting new or expanded rights-of-way projects.

100.4.0.8 Develop a white paper addressing the impacts that existing, new or expanded rights-of-way have upon wildlife, wildlife habitats and habitat connectivity.

100.4.0.9 Develop and implement policies to minimize the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats in order to benefit wildlife.

100.4.0.13 Develop policies for different circumstances (e.g., roadsides and medians, riparian, aquatic and terrestrial habitats) that outline appropriate habitat/vegetation management strategies and schedules to minimize risks to and benefit wildlife.

100.4.0.16 Develop policies to implement habitat management strategies that will increase the structural diversity surrounding areas used for energy, mining, and transportation and service corridors which include but are not limited to the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-

100.4.0.17 Develop policies to implement habitat management strategies, including prescribed burns, that will increase the structural diversity on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies to control and reduce the impacts of invasive, non-native species in order to increase structural habitat diversity.

100.4.0.18 Develop policies to minimize the extent of infrastructure associated with energy and service corridors or areas (e.g., wind and solar farms, pipelines, utility lines) and that require the implementation of habitat management strategies that will increase the structural diversity in the area including (e.g., the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides).

100.4.0.19 Develop regulations that will minimize the creation of new barriers, remove or replace current barriers with appropriately-sized systems to accommodate wildlife dispersal, and to minimize road widening and traffic volume increases within critical wildlife habitat areas.

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.21 Ensure that Section 303(d) of the Clean Water Act and applicable State statutory/regulatory requirements for surface water pollutant budgets are being met by monitoring and enforcing regulatory Total Maximum Daily Load (TMDL) targets established within regional Water Quality Management Plans.

100.4.0.22 Work with NJ DEP's Division of Land Use Regulation to ensure protection of listed species and their habitats during stream cleaning events.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Pine Barrens Snakes

Focal species that comprise this Conservation Target:

Corn Snake | Northern Pine Snake | Northern Scarlet Snake

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 2.67)

NJ Specific Threats:

- 1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.1.1.2 Loss, alteration and/or degradation of habitat.
- 1.1.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.
- 1.1.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.
- 1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 2.67)

NJ Specific Threats:

- 1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.2.1.2 Loss, alteration and/or degradation of habitat.
- 1.2.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.
- 1.2.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.
- 1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats:

- 1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.3.1.2 Loss, alteration and/or degradation of habitat.
- 1.3.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.
- 1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture (Avg. Score: 2.00)

NJ Specific Threats:

- 2.1.1.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.2 Small-holder Farming (Avg. Score: 1.00)

NJ Specific Threats:
- 2.1.2.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.
- 2.1.2.2 Fragments terrestrial and aquatic habitats.
- 2.1.2.4 Agricultural practices (e.g., mechanized, row-crop agriculture) can cause direct mortality to wildlife when harvesting takes places.

2.1.3 Agro-industry (Avg. Score: 2.00)

NJ Specific Threats:
- 2.1.3.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.
- 2.1.3.2 Fragments terrestrial and aquatic habitats.
- 2.1.3.3 Agricultural practices (e.g., mechanized, row-crop agriculture) can render lands unsuitable for most wildlife due to soil degradation and erosion.

2.2 Wood and Pulp Plantations

2.2.1 Small Holder (Avg. Score: 2.00)

NJ Specific Threats:
- 2.2.1.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.
- 2.2.1.2 Tree harvesting can cause direct mortality to wildlife, especially if done during peak activity periods or vulnerable life stages (e.g., denning, nesting, gestation/birthing, basking, roosting, pre-volancy, etc.).

2.2.2 Agro-industry Plantations (Avg. Score: 2.00)

NJ Specific Threats:
- 2.2.2.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.
- 2.2.2.2 Tree harvesting can cause direct mortality to wildlife, especially if done during peak activity periods or vulnerable life stages (e.g., denning, nesting, gestation/birthing, basking, roosting, pre-volancy, etc.).

2.3 Livestock Farming and Ranching

2.3.2 Small-holder Grazing (Avg. Score: 1.00)

NJ Specific Threats:
- 2.3.2.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.3 Agro-industry Grazing (Avg. Score: 2.00)

NJ Specific Threats:
- 2.3.3.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

3 Energy Production and Mining

3.1 Oil and Gas Facilities and Pipelines

3.1.1 Distribution processes of petroleum and other liquid hydrocarbons (Avg. Score: 2.00)

NJ Specific Threats:
- 3.1.1.1 Fragments terrestrial and aquatic habitats.
- 3.1.1.2 Loss, alteration and/or degradation of habitat.
- 3.1.1.3 Increased risk of oil spills.
- 3.1.1.4 Increased noise pollution.
- 3.1.1.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.
- 3.1.1.6 Increased risk of collision between marine mammals, sea turtles and fish and the marine-based structures/facilities.

3.1.2 Natural gas distribution processes (Avg. Score: 2.00)

NJ Specific Threats:
- 3.1.2.1 Fragments terrestrial and aquatic habitats.
- 3.1.2.2 Loss, alteration and/or degradation of habitat.
- 3.1.2.3 Increased risk of gas leaks and explosions.
- 3.1.2.4 Increased noise pollution.
- 3.1.2.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.
- 3.1.2.6 Increased risk of collision between marine mammals, sea turtles and fish and the marine-based structures/facilities.

3.2 Mining and Quarrying

3.2.2 Surface Mining - Rock Quarry (and sand quarries) (Avg. Score: 2.00)

NJ Specific Threats:
- 3.2.2.1 Fragments terrestrial and aquatic habitats.
- 3.2.2.2 Loss, alteration and/or degradation of terrestrial and aquatic habitats.
- 3.2.2.3 Increased risk of vehicle strikes/mortality to wildlife.

3.3 Renewable Energy

3.3.1 Wind Power (Avg. Score: 2.00)

NJ Specific Threats:
- 3.3.1.2 Fragments terrestrial habitats.
- 3.3.1.3 Loss, alteration and/or degradation of habitat.
- 3.3.1.4 Increased commercial infrastructure.

3.3.2 Solar Power (Avg. Score: 3.00)

NJ Specific Threats:
- 3.3.2.1 Fragments terrestrial habitats.
- 3.3.2.2 Loss, alteration and/or degradation of habitat.
- 3.3.2.3 Increased commercial infrastructure.

3.4 Conventional Power Plants

3.4.0 Conventional Power Plants (Avg. Score: 1.00)

NJ Specific Threats:
- 3.4.0.2 Loss, alteration and/or degradation of habitat due to new or the expansion of current facilities.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:
- 4.1.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species and inhibiting dispersal of non-volant animals, reducing gene flow.
- 4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.
- 4.1.1.3 Re-establishment of abandoned railroad lines may displace wildlife, in particular, less mobile species using the area to fulfill critical life history requirements.
- 4.1.1.4 Re-establishment of abandoned railroad lines may increase the risk of direct mortality on wildlife.

4.1.2 Movement of cars and other vehicles on roads and railroads (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats: 4.1.2.1 Increased vehicle traffic increases the risk of wildlife mortality from strikes.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads (Avg. Score: 2.00)

NJ Specific Threats: 4.2.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species, inhibiting dispersal of non-volant animals, reducing gene flow, and creating barriers to fish when service line-associated roads cross streams (e.g., bridges, culverts, fords, etc.).

4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

4.2.2 Management of rights-of-way or communication tower facilities and/or their associated access roads (Avg. Score: 2.00)

NJ Specific Threats: 4.2.2.1 Improper or poorly scheduled vegetation management can cause direct mortality to and may reduce productivity of wildlife.

5 Biological Resource Use

5.1 Hunting and Collecting Terrestrial Animals

5.1.1 Intentional Use (Avg. Score: 3.00)

NJ Specific Threats: 5.1.1.1 Illegal collection of wildlife can have detrimental impacts on populations.

5.1.3 Persecution/Control (Avg. Score: 2.33)

NJ Specific Threats: 5.1.3.1 Wanton killing of perceived dangerous and/or undesirable animals.

5.2 Gathering Terrestrial Plants

5.2.2 Unintentional effects (Avg. Score: 1.00)

NJ Specific Threats: 5.2.2.1 Stepping on nests or young/hatchling animals.

5.2.3 Control (Avg. Score: 0.33)

NJ Specific Threats: 5.2.3.2 Clearing of scrub-shrub vegetation [and snags] diminishes cover and nesting habitat.

5.3 Logging and Wood Harvesting

5.3.1 Intentional Use (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.1.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.1.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.1.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.2 Intentional Use (large scale) (Avg. Score: 2.00)

NJ Specific Threats: 5.3.2.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.2.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.2.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.3 Unintentional effects (subsistence/small scale) (Avg. Score: 2.00)

NJ Specific Threats: 5.3.3.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4 Unintentional effects (large scale) (Avg. Score: 2.00)

NJ Specific Threats: 5.3.4.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4.2 Extensive infrastructure and larger equipment requirements present a potential risk of direct injury/mortality to wildlife.

5.3.4.5 Lack of appropriate, sustainable forest management can lead to a decrease in forest habitat diversity, degraded habitat for many forest species, the loss of habitat for early-successional species, and/or the loss of unique habitats for species that need canopy breaks and multi-aged tree composition to fulfill various life history requirements.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized) (Avg. Score: 2.00)

NJ Specific Threats: 6.1.1.1 Inappropriate use of off-road vehicles creates new roads/trails which fragments habitat.

6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.

6.1.1.3 Increased risk of harassment that results in a change in wildlife behavior and/or direct mortality from vehicle strikes.

6.1.1.4 Increased noise pollution.

6.1.1.6 Off-road vehicles can be a mechanism of transference of wildlife diseases and invasive plant species if gear and apparel are not properly sanitized between sites.

6.1.5 Wildlife observation and photography (Avg. Score: 1.67)

NJ Specific Threats: 6.1.5.1 Improperly conducted recreational activities may disrupt normal wildlife behaviors which can result in reduced reproductive success or survival, abandonment of critical sites, etc.

6.1.5.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.1.7 Other (Avg. Score: 2.00)

NJ Specific Threats: 6.1.7.2 Human presence in sensitive areas may introduce wildlife diseases or pathogens into the system.

6.2 Military Exercises

6.2.1 Military exercises (Avg. Score: 2.00)

NJ Specific Threats: 6.2.1.1 Military testing and training exercises may inflict disturbance and potential physical harm to wildlife.

6.2.1.3 Lack of opportunity for non-federal wildlife managers to influence activities on military bases may result in detrimental impacts to SGCN and/or missed opportunities to engage in projects that benefit SGCN.

6.3 Work and Other Activities

6.3.1 Unauthorized research projects at significant habitats (Avg. Score: 2.00)

NJ Specific Threats: 6.3.1.1 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.1.2 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.1.3 Activities conducted without proper precautions may disturb and disrupt normal wildlife behaviors, which may impact reproductive success or survival, cause abandonment of critical sites, etc.

6.3.2 Authorized research projects at significant habitats (Avg. Score: 2.00)

NJ Specific Threats:

6.3.2.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.2.3 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.2.4 Activities conducted without proper precautions may disturb and disrupt normal wildlife behaviors, which may impact reproductive success or survival, cause abandonment of critical sites, etc.

6.3.3 Other "work" unrelated to research (Avg. Score: 1.00)

NJ Specific Threats:

6.3.3.1 Construction projects may disrupt normal wildlife behavior which can result in reduced reproductive success or survival, abandonment of critical sites, etc. (e.g., bridge-nesting birds).

6.3.3.4 Workers may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

7 Natural Systems Modifications

7.1 Fire and Fire Suppression

7.1.1 Increase in Fire Frequency/Intensity (Avg. Score: 2.00)

NJ Specific Threats:

7.1.1.1 Increase in frequency and intensity of wild fires as a result of droughts and heat waves drying out vegetation and litter.

7.1.1.2 Increase in frequency of wild fires as a result of illegal activities.

7.1.1.3 Unnatural fire regimes occurring as a result of military exercises.

7.1.1.4 Lack of diversity in age structure and composition of vegetation due to expansive, frequent fires.

7.1.2 Suppression of Fire Frequency/Intensity (Avg. Score: 2.67)

NJ Specific Threats:

7.1.2.1 Shift in vegetative communities as a result of suppression of natural fires.

7.1.2.2 Lack of diversity in age structure and composition of vegetation due to the suppression of fire.

7.2 Dams and Water Management/Use

7.2.12 Culverts (Avg. Score: 1.00)

NJ Specific Threats:

7.2.12.1 Improper design, placement, installation and maintenance of culverts and other stream crossing structures can impede or prevent the movements of terrestrial organisms and can restrict or limit stream flow, impeding the movement of aquatic organisms along riparian corridors.

7.3 Other Ecosystem Modifications

7.3.2 Inappropriate timing of mowing (Avg. Score: 2.00)

NJ Specific Threats:

7.3.2.1 Increased risk of direct mortality and/or reduced productivity of wildlife, as well as reduced use by migrating species.

7.3.3 Removal of coarse woody debris (streams, forests, scrub-shrub habitats) (Avg. Score: 1.33)

NJ Specific Threats:

7.3.3.2 Decreases habitat and/or corridor suitability due to limited or absent shelter and foraging habitat.

7.3.3.3 Removal of dead trees (snags), large felled logs (i.e., those > 12" dbh), and other downed woody material diminishes nesting, roosting, and sheltering options for wildlife, and increases the ease at which deer can browse regenerating vegetation.

7.3.3.4 Decreases available basking, shelter, and foraging habitats.

7.3.4 Lack of natural disturbance patterns or ecosystem functions due to species loss (Avg. Score: 1.00)

NJ Specific Threats: 7.3.4.5 The lack of forest disturbance minimizes the diversity of herbaceous vegetation and other shrubs and trees that need a lot of sunlight to grow.

7.3.5 Poor habitat management (Avg. Score: 3.00)

NJ Specific Threats: 7.3.5.1 Improper or poorly scheduled maintenance of man-made corridors (e.g., roadsides and medians) can cause direct mortality to and may reduce productivity of wildlife.

7.3.5.3 Vegetation clearing removes terrestrial and riparian corridors for animal movement, shelter, and resting areas.

7.3.5.5 Habitat management that alters or removes vegetation without implementing long-term management increases the risk of invasive and exotic plants establishing themselves, outcompeting native vegetation.

7.3.5.6 Habitat management, including that which occurs on public and private lands, that does not consider timing and species' behaviors can result in the direct mortality and/or alteration or loss of habitat.

7.3.5.7 Improperly planned habitat management and/or mitigation efforts along roadsides and within the medians can attract wildlife and increase the risk of vehicle strikes.

7.3.5.12 Lack of diversity in age structure and composition of vegetation due to lack of natural disturbances and/or vegetation management.

7.3.5.14 Intentional felling and removal of dead standing trees or snags eliminates resting, nesting or feeding habitat, and precludes the snags eventual contribution to coarse woody debris and forest floor structure and habitat.

7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.1.1.1 Displace or outcompete native species for resources.

8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.

8.1.1.3 Invasive, non-native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

8.1.1.4 Invasive, non-native animals increase the risk of predation on native animals and/or herbivory on native vegetation.

8.1.1.5 Invasive, non-native animals and plants increase the risk of introduction and transference of diseases

8.1.1.6 Invasive, non-native plants may create physical barriers for some species.

8.1.4 Invasive non-native terrestrial/wetland animals (Avg. Score: 1.00)

NJ Specific Threats: 8.1.4.1 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.4.2 Free-roaming and feral domestic animals such as cats and dogs causes direct mortality of wildlife and disturbance to wildlife breeding and resting areas.

8.1.5 Invasive non-native terrestrial/wetland plants (Avg. Score: 1.00)

NJ Specific Threats: 8.1.5.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.6 Invasive non-native fungal/bacterial diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.1.6.1 The introduction of non-native fungal and bacterial diseases threatens native populations and ecosystems.

8.2 Problematic Native Species/Diseases

8.2.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.2.1.1 Overabundant native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

8.2.1.2 Invasive pathogens and insects may increase in range and abundance as limiting factors (such as temperature) are altered as a result of climate change.

8.2.1.4 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.2.2 Named Species (Avg. Score: 1.00)

NJ Specific Threats: 8.2.2.2 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.4 Problematic Species/Diseases of Unknown Origin

8.4.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.4.1.1 Non-native or poorly understood diseases and parasites could potentially impact native animals.

8.4.2 Named Species (Avg. Score: 2.00)

NJ Specific Threats: 8.4.2.2 Diseases of unknown origin, such as snake fungal disease and Ranavirus, can cause significant mortality among native animal populations.

8.5 Viral/Prion-induced Diseases

8.5.1 Unspecified Species (Disease) (Avg. Score: 1.00)

NJ Specific Threats: 8.5.1.1 There is a large knowledge gap regarding the existence of, or potential for, other diseases impacting native wildlife.

8.5.2 Named Species (Disease) (Avg. Score: 2.00)

NJ Specific Threats: 8.5.2.1 Diseases such as West Nile Virus, arenavirus, sudden oak death, Avian Influenza, and snake fungal disease cause morbidity or mortality to native populations.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.2 Industrial and Military Effluents

9.2.1 Oil Spills (Avg. Score: 1.00)

NJ Specific Threats: 9.2.1.1 Oil spills render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.1.2 Oil spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.1.3 Oil spills cause external oiling of wildlife and ingestion of oil, both of which can injure or kill wildlife.

9.2.3 Other (Avg. Score: 1.00)

NJ Specific Threats: 9.2.3.2 Chemical spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.3.3 Chemical spills may render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.4 Other: Hydrofracturing (Avg. Score: 1.00)

NJ Specific Threats: 9.2.4.2 Uncontrolled effluents escaping from hydrofracturing facilities can cause injury to wildlife and alter normal behaviors.

9.2.5 Other: Industrial toxic settling ponds (Avg. Score: 1.00)

NJ Specific Threats: 9.2.5.1 Surficial or open industrial effluent ponds can cause injury or death to wildlife that become exposed through ingestion or submersion.

9.3 Agricultural and Forestry Effluents

9.3.2 Soil Erosion and Sedimentation (Avg. Score: 1.00)

NJ Specific Threats: 9.3.2.2 Soil erosion and sedimentation limit the re-establishment of plants needed by terrestrial wildlife as cover and a food base.

9.3.3 Herbicides and Pesticides (Avg. Score: 1.00)

NJ Specific Threats: 9.3.3.2 Use of rodenticides can cause secondary actions of injury and death to animals in the course of scavenging.

9.3.3.3 Use of pesticides can directly harm non-target species through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture (Avg. Score: 1.00)

NJ Specific Threats: 9.3.5.1 Use of pesticides, insecticides, and/or herbicides can directly harm non-target species, such as amphibians and beneficial invertebrates through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5.4 Improper use of current insecticides, such as those containing esfenvalerate, prallethrin, or piperonyl butoxide, or past use of pesticides containing chlordane still present in the soils, are toxic to various wildlife species, and can cause injury, mortality, or other effects that impair population viability.

9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.4 Garbage and Solid Waste

9.4.1 Direct hazards to wildlife (Avg. Score: 1.00)

NJ Specific Threats: 9.4.1.1 Wildlife may ingest garbage causing choking or impingement in the digestive system, or they may become physically entangled in it (e.g., plastic or abandoned fish nets); conditions that make them unable to feed or drink, cause them to suffocate or drown, or otherwise restrict the animal's movement making them more susceptible to predators, starvation or injury.

9.4.1.2 Garbage and solid waste destroys natural habitats and obstructs wildlife movements.

9.5 Air-Bourne Pollutants

9.5.6 Herbicides and Pesticides (Avg. Score: 2.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

9.6 Excess Energy

9.6.3 Noise Pollution (Avg. Score: 1.00)

NJ Specific Threats: 9.6.3.1 Acute and chronic noise pollution in and adjacent to terrestrial and aquatic (marine and freshwater) environments could disrupt normal behaviors of wildlife such as migration, communication, feeding, eluding predators, resting and breeding, etc.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 1.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.3 Temperature Extremes

11.3.1 Temperature extremes (Avg. Score: 2.00)

NJ Specific Threats: 11.3.1.4 Extremely low temperatures and/or extensive periods of unseasonably low temperatures during critical life history stages (e.g., hibernation, gestation/nesting) can alter animals' behaviors and decrease survivorship.

11.4 Storms and Flooding

11.4.2 Increased rainfall (Avg. Score: 2.00)

NJ Specific Threats: 11.4.2.2 Extreme rain events can damage wildlife nesting and resting habitats, including impacts to avian eggs and chick and small mammal survivorship.

11.4.2.3 More frequent rain events can alter terrestrial and wetland vegetation communities as well as wetland hydrology, shifting wildlife community use.

11.6 Phenology Shifting or Alteration

11.6.2 Phenology shifts related to predator-prey ecology (Avg. Score: 1.00)

NJ Specific Threats: 11.6.2.1 Alters inter-specific relationships (e.g., competition, parasitism, predation) of wildlife, ultimately leads to detrimental impacts on the ecological system.

11.6.2.2 Shifts timing of species migration, breeding and hibernation, and available food resources, causes redistribution of species, or mortality for species that are unable to relocate due to their already isolated habitat or limited mobility.

11.6.3 Phenology shifts related to species redistribution (Avg. Score: 1.00)

NJ Specific Threats: 11.6.3.1 Shifts in timing of species migration, breeding and hibernation, and available food resources, as a result of wildlife range shifts driven by climate change.

11.6.3.2 Shifts in nesting times or egg incubation durations can limit nest success and longterm populations.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 2.67)

NJ Specific Threats: 12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.2 Lack of up-to-date existing information (Avg. Score: 3.00)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.3 Need to answer research question (Avg. Score: 3.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.4 Need to develop new technique (Avg. Score: 2.00)

NJ Specific Threats: 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 1.00)

NJ Specific Threats: 12.3.0.1 Regulatory habitat protections within state land use regulations are spatially limited to specific geographic areas (e.g., Pinelands, Coastal Area) or geographic features (e.g., wetlands, streams) and so fail to protect critical habitats that exist outside of these regulated areas.

12.3.0.3 Lack of a licensing program and standards for NJ Nuisance Wildlife Control Operators (NWCOs) leads to inadequate controls over handling of wildlife and lack of reporting of non-game/SGCN species (and all wildlife) encountered in nuisance situations.

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.9 Prescribed burns implemented by the NJ Forest Fire Service are constrained by State air quality regulations to a timeframe where seasonal weather conditions are less than ideal for effective burning. As a result, the Forest Fire Service is limited in the number of overall prescribed burns it can implement to restore habitat for wildlife.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 1.00)

NJ Specific Threats: 12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.

12.4.0.3 Lack of internal understanding regarding beneficial habitat impacts of storm events leads to policies and practices that reverse or decrease such beneficial effects (e.g., beach-filling, shoreline hardening, “hazard” tree and log removal from forests, etc.

12.4.0.5 Bureau of Forest Fire Management policy has traditionally implemented prescribed burns on State lands for the sole purpose of public safety (i.e., addressing hazard fuel reduction), missing opportunities to burn in a manner that would additionally manage habitat for ecological diversity.

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 2.00)

NJ Specific Threats: 14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 2.00)

NJ Specific Threats: 14.2.1.1 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various forest management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 1.00)

NJ Specific Threats: 15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.4 Secure and promote the protection, restoration, and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts through incentive programs.

1.2.1.5 Secure and promote the protection/restoration of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.9 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing Forestry Stewardship Programs.

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.12 Create incentives (non-monetary and/or monetary) for land developers to redevelop abandoned areas (e.g., shopping centers, office complexes) to minimize the loss of natural habitats and reduce the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.18 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and land managers to control and reduce the impacts of invasive, native and non-native species in order to increase structural habitat diversity.

1.2.1.19 Create incentives for federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to farmers, woodland landowners, and private landowners to adopt and/or endorse consistent BMPs concerning controlled burns to maintain and/or improve wildlife habitat.

1.2.1.20 Coordinate across government agencies and non-government organizations to create or expand upon tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMP's.

1.2.1.23 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to provide cost shares and/or plan approvals for management based on management approaches and prescriptions.

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

1.2.1.28 Create incentives to implement dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

2 Direct Management of Natural Resources

2.2 Dam and barrier removal

2.2.1 Culvert work

2.2.1.1 Replace existing barriers to wildlife movement with and/or install appropriately-sized systems to accommodate wildlife dispersal.

2.3 Fire management

2.3.2 Fuel reduction

2.3.2.1 Prevent wildfires by reducing natural fuel (e.g., leaf litter).

2.3.3 Prescribed burning

2.3.3.1 Evaluate different management techniques of prescribed burns that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

2.3.3.3 Conduct prescribed burning to improve wildlife habitat.

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.5 Implement biologically safe and appropriate control/management strategies, and where appropriate, eradication strategies to reduce the impacts and/or limit the distribution of invasive and/or non-native plant species within or near aquatic systems using methods that will provide the most protection to the aquatic and riparian ecological system, and minimize disturbance to the soil and wildlife. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.8.0.6 Implement long-term management of invasive and/or non-native plants to help maintain functioning ecological systems and biological diversity, and to enhance travel corridors. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.2 Improve the availability of prey/food resources through terrestrial and aquatic plantings and habitat restoration for SGCN populations, in particular for those populations thought to be limited due wholly or in part to a lack of (or contaminated) food resources, and for migratory species (birds, bats, invertebrates).

2.10.0.3 Restore and/or enhance habitats to benefit urban-associated SGCN.

2.10.0.4 Restore and/or enhance suitable travel corridors connecting conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.8 Protect significant natural and/or unique communities by implementing best management practices when conducting habitat restoration strategies.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.10 Minimize the loss of important habitats (e.g., coastal scrub-shrub and grassy habitats, high and low marsh habitats, etc.) that provide nesting, migrating, and wintering areas for SGCN birds and other coastal and marsh-dependent species through habitat restoration efforts.

2.10.0.12 Create and/or maintain scrub-shrub habitats through revegetation efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.15 Restore and/or enhance terrestrial and aquatic habitats proximate to but not adjacent to roads and other transportation corridors for terrestrial-bound SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.10.0.21 Restore and/or enhance understory habitats that suppress invasive species and provide critical resources and enhance sheltering, foraging, and nesting cover for wildlife.

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.10.0.24 Use NJ's CHANJ mapping and guidance to establish vegetation and enhance or create corridors between fragmented habitats with similar vegetation, slope, soils, structure, etc. to ensure vegetative integrity is maintained to allow wildlife to safely disperse, and corridors are buffered with natural habitats to minimize disturbance to wildlife within the corridors.

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.11.0.3 Create suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats through vegetation management.

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through vegetation management.

2.11.0.6 Reclaim degraded rare species habitats by conducting vegetation management needed to restore habitat value for the documented/target SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.13 Implement best management practices (BMPs), protective strategies, and guidelines for vegetation management to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.11.0.14 Conduct vegetation management adjacent to roads for SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.11.0.16 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.11.0.18 Implement forest management/silvicultural strategies that promote the development of new old-growth forests and/or minimize the loss of old-growth forest stands with large trees and within large, contiguous tracts.

2.11.0.19 Implement forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN.

2.11.0.20 Create and/or maintain scrub-shrub habitats through management efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.11.0.23 Implement appropriate habitat management actions in areas where natural disturbances, such as wildfire, have been precluded.

2.11.0.25 Conduct vegetation management along access roads following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.26 Conduct vegetation management along roadsides and medians, avoiding peak activity periods for wildlife, that enhances wildlife dispersal naturally and safely across roads and similar barriers to/between terrestrial and/or aquatic habitats.

2.11.0.27 Conduct vegetation management for target shrub- or young forest-dependent SGCN following BMPs to minimize the risk of the establishment of invasive and non-native plants.

2.11.0.28 Conduct vegetation management in agricultural areas following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.29 Conduct vegetation management on transportation and service corridors (i.e., rights-of-way) following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.31 In areas where vegetative communities are shifting due to fire suppression and controlled burns are not feasible, manage vegetation to improve wildlife habitat.

2.11.0.32 Increase structural habitat diversity around and when feasible, within agricultural landscapes by managing vegetation for a variety of species, in particular, those farms that have removed scrub-shrub habitat and/or fragmented forests, and by implementing ecologically best practices (e.g., no-till farming, maintaining hedgerows, buffer set-asides, etc.).

2.11.0.33 Increase structural habitat diversity by implementing long-term vegetation management to minimize the potential for the establishment of invasive and/or non-native plants that may outcompete native vegetation.

2.11.0.34 Increase structural habitat diversity by managing residential, commercial and recreational areas' landscapes for a variety of species. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.

2.11.0.37 Increase structural habitat diversity by minimizing the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats which benefits wildlife.

2.11.0.38 Increase structural habitat diversity in and around horse/livestock farms by managing vegetation for a variety of species, in particular, in and around farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

2.11.0.39 Increase structural habitat diversity in and around solar farms by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.40 Increase structural habitat diversity surrounding areas used for energy, mining, and transportation and service corridors by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides, and avoid managing habitat during the breeding seasons for ground-nesting birds, reptiles, amphibians and small mammals.

2.11.0.41 Increase structural habitat diversity through the implementation of a variety of vegetation management practices such a prescribed burns (either increasing or decreasing their frequency depending on the site and objective), plantings, etc. that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.42 Increase structural habitat diversity within wind farms for terrestrial bound and low-flying species and around wind farms for other wildlife by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.43 Manage forests to increase variation in age structure and composition using BMPs that promote and maintain functioning ecological forest-based systems and biological diversity.

2.11.0.45 Regularly and/or rotationally create young forest habitat in targeted areas to maintain and regenerate a mosaic of upland forest habitats that will benefit shrub- and young forest-dependent species.

2.13 Wildlife damage management

2.13.0 Nuisance fish and wildlife damage

2.13.0.5 Investigate the impacts of human-subsidized and/or naturally occurring predator species on SGCN to assess the need for integrated wildlife damage management techniques (e.g., predator exclosures, fish blockages, electric fence, culls) and/or policy changes on state land management that minimize the impacts of human-subsidized predators.

2.13.0.8 Implement and assess management strategies to control and reduce the impacts of detrimental species and diseases that pose threats to native wildlife or communities.

2.14 Wildlife disease management

2.14.0 Wildlife disease strategy development and investigation

2.14.0.1 Investigate diseases/pathogens impacting SGCN and/or their habitats.

2.14.0.2 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

2.14.0.4 Conduct long-term monitoring of diseases in vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts.

2.14.0.5 Assess the impacts of diseases on the life cycles of wildlife.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.6 Conduct long-term studies on resident and migratory SGCN to determine if there are changes to the populations' demography (productivity, survival, dispersal) and/or to their critical and/or supporting habitats (i.e., diminishing in value, acreage or connectivity, etc.), in particular changes that would not maintain SGCN at viable levels for species populations. Update data and GIS maps; provide updated information to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.11 Develop, implement and evaluate the effectiveness of town plans that avoid impacts to SGCN species and their habitats.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.19 Identify the presence and status (e.g., functioning, structure, slated for removal, etc.) of existing dams and culverts within and/or that may impact SGCN and their habitats, and create a database that includes a GIS component identifying the locations of such structures and their status. Share this information with appropriate organizations and/or agencies evaluating the benefits and risks of such structures on SGCN and their habitats.

3.0.0.20 Once baseline data identifying and describing the status of existing dams and culverts have been gathered, conduct evaluations at a variety of sites to determine whether the benefits of culvert and dam creation or removal outweigh the risks to SGCN species and their habitats, and if other variables/conditions specific to individual sites/locations result in a different outcome. Identify and target appropriate dams and culverts for removal and/or reconstruction to minimize harm to SGCN species and their habitats.

3.0.0.26 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species including objectives and guidance pertaining to and the condition/status of critical and supporting habitats.

3.0.0.27 Evaluate the effectiveness of strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals through research and monitoring. Develop and provide NJ DEP and other appropriate governing agencies/commissions a summary of findings and recommendations to improve such efforts.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.4 Conduct long-term monitoring of the impacts of contaminants to vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.2.0.5 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

3.2.0.6 Develop, implement and conduct studies to evaluate the effectiveness of methods implemented to reduce road mortality of wildlife (e.g. wildlife underpasses, road closures).

3.2.0.7 Track (via a database that includes a GIS component) and research problematic species and diseases to determine their distribution, impacts on SGCN wildlife/wildlife communities, and develop potential control measures.

3.2.0.8 Implement and conduct long-term monitoring of control measures aimed at minimizing the impacts of problematic species and/or diseases to evaluate the effectiveness of such efforts and to identify and incorporate additional strategies as appropriate.

3.2.0.10 Evaluate the effectiveness of sanitation/decontamination protocols in minimizing the transference of wildlife diseases and invasive plant species.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.2 Age, size and sex structure

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.3 Baseline inventory

3.2.3.6 Investigate the feasibility and potential for success of conducting genetic rescue through translocation and/or reintroduction of animals into suitable habitat that was historically occupied to increase genetic diversity and reconnect isolated populations. Methods of investigation should include, but are not limited to, thorough literature reviews, expert opinions, identifying potential pitfalls (e.g., species' fidelity to their range or critical areas), and an examination of historic and current SGCN population distribution and suitable habitat availability.

3.2.3.7 Identify roads or portions of roads, paved or unimproved (through site surveys, land use/land cover assessments and analyses, review of available data, enlistment of species experts, etc.) with high incidences of road mortality and/or presence of snakes, turtles, medium-sized and large mammals. Conduct assessments of the roads and incorporate information into a database that includes descriptions (e.g., qualifiers to help prioritize the roads' risk to wildlife) and a GIS component of the locations of such areas. Share this information with appropriate organizations and/or agencies working to implement measures (e.g., wildlife passages, road closures) to minimize the risk to these species.

3.2.4 Food habits

3.2.4.1 Monitor and investigate the populations and health of SGCN prey/food resources for those SGCN whose populations are thought to be limited due wholly or in part to a lack of food resources or toxins in food resources.

3.2.5 Genetics

3.2.5.1 Investigate the feasibility and potential for success of conducting genetic rescue through translocation and/or reintroduction of animals into suitable habitat that was historically occupied to increase genetic diversity and reconnect isolated populations. Methods of investigation should include, but are not limited to, thorough literature reviews, expert opinions, identifying potential pitfalls (e.g., species' fidelity to their range or critical areas), and an examination of historic and current SGCN population distribution and suitable habitat availability.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.6 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) that could, through revegetation and/or enhancement efforts, become suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN.

3.3.1.7 Map and prioritize existing and potential areas for early succession forest management. Share the results with state, county and municipal planners.

3.3.1.8 Assess the availability and suitability of forest habitats for SGCN species (particularly reptiles and amphibians, birds, pollinators, and tiger beetles) in southern forests since Superstorm Sandy.

3.3.1.16 Gather "best information" for spatial modeling and update/create a current model/depiction of anticipated habitat shifts from sea-level rise, flooding, etc.

3.3.1.17 Identify and map undeveloped roads and trails in all conserved forests, and create a database of locations. Integrate information regarding potentially sensitive areas.

3.3.1.19 Identify and codify legal ORV access areas on state (and if appropriate, other conserved) lands. Provide GIS mapping to the landowner for potential use in directing such recreational activities.

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.2 Monitoring

3.3.2.1 Evaluate the effectiveness of forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.8 Evaluate the effectiveness of current prescribed burning practices on Pinelands dependent species.

3.3.2.9 Investigate the effectiveness of various silviculture techniques for enhancing forests for forest-dependent SGCN.

3.3.2.10 Evaluate the efficacy and success of different management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.3.2.15 Investigate the effectiveness of management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.3.2.20 Once a system is developed for reporting and qualifying new locations of invasive species, develop, implement and monitor/evaluate invasive species removal strategies at identified locations. Priority should be given to those areas critical to SGCN and/or contain unique and/or rare plant communities supporting SGCN and/or other fish/wildlife species.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.3 Develop/improve management techniques that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.7 Develop/improve forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

3.5.3.8 Develop best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5.3.9 Develop strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.14 Develop aquaculture practices in the coastal areas that are compatible with the recovery of SGCN.

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.3.16 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.3.19 Work with foresters to develop prescribed burning practices for Pinelands dependent species that increase or maintain habitat quality for these species in the Pinelands.

3.5.3.20 Develop guidance on various silviculture techniques for enhancing forests for forest-dependent SGCN.

3.5.3.21 Develop management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.24 Based on research, modify management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.1 Develop studies to evaluate management strategies to improve the availability of prey/food resources for SGCN whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources. Monitor and investigate the management strategies over time to determine success and/or the need to revise methods.

3.5.4.5 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

3.5.4.6 Investigate the feasibility of mitigating for the impacts of contaminants to vulnerable wildlife, particularly SGCN. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.5.4.7 Investigate the feasibility and potential for success of conducting genetic rescue through translocation and/or reintroduction of animals into suitable habitat that was historically occupied to increase genetic diversity and reconnect isolated populations. Methods of investigation should include, but are not limited to, thorough literature reviews, expert opinions, identifying potential pitfalls (e.g., species' fidelity to their range or critical areas), and an examination of historic and current SGCN population distribution and suitable habitat availability.

3.5.4.9 Conduct studies to evaluate the impacts of roads on SGCN and develop, implement and conduct studies to evaluate the effectiveness of methods to reduce road mortality of wildlife (e.g. wildlife underpasses, road closures).

3.5.4.13 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.4.14 Develop and implement agreements, and update existing agreements, with government agencies regarding the protection of critical SGCN habitats (e.g., significant breeding populations of beach nesting birds, colonial waterbird nesting areas, bat colonies, etc.).

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.17 Investigate new, non-invasive techniques for SGCN population evaluation through literature review, expert opinion, trial studies (if low risk), etc.

3.5.4.18 Investigate the effectiveness of survey techniques through selected “ground truthing” and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

3.5.4.21 Develop BMPs to address problematic species and diseases of unknown origin.

3.5.4.22 Investigate the efficacy of implementing strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities.

4 Education

4.1 Educator/Instructor training

4.1.0 Public education

4.1.0.1 Provide educational resources and training programs to private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

5 Facilities and Areas

5.15 Wildlife Management Areas

5.15.6 Roads

5.15.6.2 Clearly post areas/trails where vehicle access is not permitted.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.1 Enhance and increase the effective size of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates by securing adjacent habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.6 Secure and protect old-growth forest stands with large trees and/or stands that are approaching or being actively managed for old growth forests, in particular those within large, contiguous forest tracts, through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.7 Secure and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.8 Secure and protect scrub-shrub habitats for SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.1 Promote the protection of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates and enhance these lands by increasing the effective size through conservation area designations of stopover habitats and adjacent private lands.

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.6 Promote the protection of old-growth forest stands with large trees and/or stands that are approaching or being actively managed for old growth forests, in particular those within large, contiguous forest tracts, through conservation area designations.

6.3.0.7 Promote the protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through conservation area designations.

6.3.0.8 Promote the protection of scrub-shrub habitats for SGCN through conservation area designations.

6.4 Private lands agreements

6.4.0 Private land agreement strategies

6.4.0.1 Enter into private lands agreements to expand control burns on private lands, in particular those adjacent to conserved lands to improve SGCN habitats.

7 Law Enforcement

7.1 Law enforcement

7.1.3 Sub-national Level

7.1.3.2 Increase the number of law enforcement officers tending to wildlife issues to a reasonable number to sufficiently cover the State and marine waters.

7.1.4 Scale Unspecified

7.1.4.3 Increase law enforcement presence proximate to sensitive areas [e.g., avian nesting sites, in particular rookeries, and reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively)] to deter human activity and subsequent disturbance to SGCN.

7.1.4.6 Recruit law enforcement to assist in the protection and enhancement of SGCN populations, in particular endangered species, through improved awareness of species through trainings, partnerships, and other methods. Information should include but is not limited to: 1) Issues concerning illegal collection of reptiles, 2) Persecution of rare snakes, 3) Illegal recreational activities on public lands (e.g., off-road vehicles) and their impact on wildlife, 4) Identification of sensitive areas, critical sites and/or "hot-spots" for collection.

7.1.4.7 Increase law enforcement presence to enforce regulations governing recreational activities (e.g., the use of personal watercraft and off road vehicles, caving, rock climbing, etc.) on conserved lands and within other sensitive habitats, and discourage activities that cause harm or disturbance to vegetation, wetlands, fish and wildlife.

7.1.4.9 Implement policies that improve and secure habitat connections between conserved SGCN habitats.

7.1.4.10 Implement policies that promotes expanding acreages and enhances the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.14 Implement policies that protect existing and developing old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

7.1.4.15 Implement policies that preserve and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

7.1.4.19 Implement policies that protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

7.1.4.22 Implement policies and/or regulations that prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

7.1.4.23 Implement policies that minimize wildlife road mortality.

7.1.4.25 Encourage the enforcement of municipal laws regulating domestic pets that may predate on wildlife.

7.1.4.26 Educate law enforcement personnel that there may be unauthorized research projects taking place and to encourage them to investigate any activities that appear to be harmful to wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.1.0.4 Engage government agencies, conservation partners and other stakeholders in constructive dialogues encouraging them to influence policy change and the creation of incentives through a habitat bill and/or municipal ordinances for backyard habitat.

8.1.0.11 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting sportsmen's organizations and fisheries, as well as public constituents, addressing the unintended effects abandoned fishing gear, tackle and crab pots can have on wildlife, and promote the collection and/or reporting of abandoned items and their locations.

8.1.0.13 Engage DOD in a constructive dialogue regarding strategies to minimize disturbances to all SGCN (i.e., beyond their federal requirements) from forest management and other practices on their lands.

8.1.0.14 Engage DOD in a constructive dialogue regarding strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities.

8.1.0.15 Engage government agencies, conservation partners and other stakeholders in discussions encouraging and supporting the creation of laws and policies requiring vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

8.1.0.16 Engage local governments in discussions regarding the importance of them adopting/passing ordinances which require assessing and addressing secondary impacts (i.e., ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

8.1.0.17 Engage municipalities in constructive dialogue to identify and minimize destruction of areas prioritized for early succession forest management.

8.1.0.18 Engage NJDOT, NJ Transit Authority and other road management entities, wildlife conservation organizations/agencies (e.g., Division of Fish and Wildlife, New Jersey Conservation Foundation, Conserve Wildlife Foundation of NJ), and communities and citizens in discussions regarding the importance of and methods to enhance habitat connectivity, and work together to develop feasible strategies for ensuring that wildlife can disperse naturally and safely across roads and similar barriers to terrestrial and/or aquatic habitats.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.21 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation human-subsidized and/or overabundant, native species cause to local nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.26 Coordinate across federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to woodland landowners to adopt or endorse consistent best management practices concerning controlled burns to maintain and/or improve forested habitat for wildlife.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.34 Work with the NJ Education Association and Department of Education to design curriculum and outdoor experimental learning opportunities, and provide training to teachers on implementation of these activities.

8.1.0.37 Enlist landowners and NJ citizens in the protection of and survey efforts for SGCN, in particular rare species, by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management and wildlife-related volunteer programs.

8.1.0.38 Engage partners, stakeholders and land managers in constructive dialogue promoting forest stewardship for SGCN that use core forests and forested corridors.

8.1.0.40 Encourage researchers, land managers, naturalists and enthusiasts to follow proper procedures for the coordination and/or permitting of research/management activities involving wildlife and sensitive habitats, and discourage activities that alter vegetation or wetlands, or cause harm or disturbance to wildlife.

8.1.0.42 Engage citizens, wildlife observers and photographers through discussions and distributable information regarding the importance of and encouraging implementing responsible and ethical behavior when observing wildlife by developing an alliance of wildlife photographers and widely circulating recommendations on how to reduce impact.

8.1.0.44 Engage conservation partners, stakeholders, government agencies and other land stewards in constructive dialogues encouraging their inclusion of controlled burns in forest and other stewardship plans.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.6 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners, land managers and local communities to discourage the presence of managed cat colonies and trap, neuter and release programs in wildlife habitats.

8.3.0.7 Develop and provide (or otherwise make publicly available) educational programs and/or materials that describe the negative impacts of off-road vehicles and watercraft use in and adjacent to critical SGCN habitats, and the importance of confining such activities to more appropriate locations and/or seasons.

8.3.0.8 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate recreationists and encourage landowners to eliminate garbage in the vicinity of suitable wildlife habitat, in particular SGCN habitat. Information should include the detrimental impacts garbage may have on various wildlife species.

8.3.0.9 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners and land managers to include only native plants in landscaping and restoration projects. Provide information to assist them in detecting problematic establishment of invasive, non-indigenous plants.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.11 Develop and provide (or otherwise make publicly available) educational programs and/or materials to the public, wildlife-related professionals, foresters, etc., that describe the value of species that are often feared (e.g., snakes, bats, spiders, Allegheny woodrat) and/or deemed a "nuisance" (e.g., squirrel, deer, snapping turtle), and therefore, persecuted by people. Include information on tolerance, proper identification, eviction from human dwellings, how to minimize the animal's presence on the property, and/or how to live in harmony with the animal.

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.19 Develop an educational outreach program for the public on the devastating effects predators can have on native nesting wildlife.

8.3.0.24 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

8.3.0.26 Develop educational outreach programs for private and public landowners and land managers regarding the importance of and how to manage core forests and forested corridors in a way that will be beneficial for SGCN, particularly endangered, threatened and special concern species.

8.3.0.27 Develop educational outreach programs for public and private landowners and land managers regarding the importance of structural habitat diversity, methods to increase diversity, and/or incentive programs available to increase habitat diversity.

8.3.0.30 Develop educational outreach programs for private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

8.3.0.31 Develop an educational outreach program for landowners and citizens on the secondary impacts of rodenticides on predators and scavengers.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.5 Develop a plan that directs the creation or expansion of energy or utility rights-of-way in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.6 Develop a plan that directs the creation or expansion of roads and railroads or the re-establishment of abandoned railroads within and adjacent to critical forested habitats in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.8 Develop a plan that focuses on strategies for oil pipelines to avoid sensitive habitats that would be highly impacted by oil spills.

9.1.0.9 Develop a plan that focuses on strategies to minimize the creation of renewable energy farms (e.g., solar, wind) and related infrastructures within and their impacts on forested habitats and the wildlife community.

9.1.0.10 Develop a plan that focuses on strategies to minimize the impacts of mining on critical forested habitats.

9.1.0.11 Develop a plan that focuses on strategies to minimize the impacts of power plants on critical forested habitats and the wildlife community.

9.1.0.15 Develop a plan to minimize fragmentation of terrestrial and aquatic habitats by roads.

9.1.0.16 Develop a plan to minimize new lawnscapes and preserve natural vegetation within and adjacent to critical forest areas.

9.1.0.18 Develop a plan to minimize the effects of road widening and traffic volume increases within critical wildlife habitat areas using CHANJ products.

9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

9.1.0.20 Develop a plan to minimize the impacts of existing agricultural properties adjacent to and the conversion of forest habitats (terrestrial and aquatic, within or adjacent to critical forests) to agriculture, grazing areas/livestock farms, and plantations.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.23 Develop a plan to mitigate the effects of transportation barriers by using CHANJ products.

9.1.0.27 Develop a plan to use wildlife-appropriate culverts in critical forested areas.

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.2 Organizational strategic and CMS planning

9.2.1 Organizational strategic and operational planning

9.2.1.1 Identify and codify legal ORV access areas on state lands.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.7 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.10 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.14 Create species management plans that will promote the protection and where appropriate, the development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

9.3.1.16 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.2 Listed species recovery planning

9.3.2.1 Develop proactive species recovery plans for all endangered and threatened species including guidance and objectives pertaining to critical and supporting habitat to meet and maintain recovery goals.

9.3.3 Habitat management planning

9.3.3.5 Develop a management plan using forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

9.3.3.6 Develop a management plan for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

9.3.3.7 Develop a management plan to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

9.3.3.8 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.3.13 Develop a management plan that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas and prevents or ameliorates near-term impacts of climate change throughout the State, but in particular within the coastal and Delaware Bay areas.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.16 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.3.17 Develop a management plan for prescribed burning that will benefit Pinelands dependent species and increase or maintain habitat quality for these species in the Pinelands.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.21 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.3.22 Create management plans to minimize and/or prevent wildlife road mortality that will incorporate wildlife passages in conjunction with barrier fencing and, where possible, seasonal closures. Aquatic-associated passages must avoid disturbance to the natural streambeds and riparian habitat, permit high volumes of water to flow freely, and provide adequate travel corridors for terrestrial wildlife, while maintaining stream flow for fish passage. Bridges that span rivers and streambeds and include floodplain habitat on either side of the span to provide travel corridors for terrestrial wildlife are preferred over culverts.

9.3.3.23 Create forest management plans that will promote the protection and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

9.3.3.29 Develop habitat management plans aimed at reducing or eliminating negative impacts of ORVs.

9.3.3.32 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3.34 Include controlled burn prescriptions in forest and stewardship plans to improve wildlife habitat.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.10 Use CHANJ mapping in reviews of proposed energy, mining, transportation and utility service companies/agencies' projects to attempt to maintain habitat connectivity and reduce fragmentation, and identify potential impacts of the projects.

11.1.1.12 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed solar farm projects to reduce habitat fragmentation and minimize impacts on wildlife.

11.1.1.13 Use the best available science (species data, habitat present, wind farm layout options, wind blade impacts on migratory species, location of migration routes, etc.) when conducting regulatory reviews of proposed wind farm projects to minimize impacts on migratory and resident wildlife and reduce habitat fragmentation.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.2 Provide technical support to public and private landowners and land managers for controlling invasive, native and non-native plant species in order to increase structural habitat diversity.

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.4 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the secondary impacts of rodenticides on predators and scavengers.

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.7 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on the importance of maintaining habitat connectivity, minimizing fragmentation, and the use of CHANJ products to help them target areas for such planning.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.11 Provide educational resources, training programs, and on-the-ground guidance to private and public landowners and land managers on the benefits of and for creating young forest and early succession habitat for SGCN.

11.2.0.13 Provide educational resources and technical support to public landowners, private landowners with sufficient acreage, and land managers to promote the protection and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

11.2.0.16 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

11.2.0.19 Provide educational resources and technical support to public and private landowners and land managers to promote the protection and/or enhancement of scrub-shrub habitats for SGCN.

11.2.0.21 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates to promote the protection and/or enhancement of those adjacent habitats to increase the effective size of the migratory habitat.

11.2.0.22 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

11.2.0.23 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to SGCN habitats to promote the protection and/or enhancement of those adjacent habitats to increase the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and that connect conserved SGCN habitats.

11.2.0.24 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers on how to manage vegetated roadside areas (e.g., mowing, brush-hogging, etc.) on a schedule that avoids peak activity periods for wildlife and therefore, minimizes harm.

11.2.0.25 Provide educational resources, training programs, and on-the-ground guidance to resource managers regarding the assessment of and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) related to residential and commercial development.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.0.29 Provide educational resources, training programs, and on-the-ground guidance to Nuisance Wildlife Control Operators (NWCOs), conservation partners, and the public in conserving snake populations by advising proper removal from buildings, exclusion methods from buildings, and improving the public's understanding and acceptance of snakes.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.1 Engage partners and stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.3 Provide educational resources, training programs, and on-the-ground guidance to DOD to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop and implement forest management and other practices that minimize disturbances to SGCN (i.e., beyond their federal requirements).

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

11.2.2 With private landowners

11.2.2.1 Provide technical support to farming operations and woodland landowners on ways to decrease clean farming (edge-to-edge) practices and create ecotones to benefit bobwhite and other species dependent on early successional habitat.

100 Law and Policy

100. Legislation

100.1.3 Sub-national Level

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.4 County and Local

100.1.4.1 Enhance critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates through the local ordinances of adjacent private lands to increase the effective size of the habitat.

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.3 Expand the acreages and enhance the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN through local ordinances.

100.1.4.9 Secure existing and developing old-growth forest stands with large trees, in particular those within large, contiguous forest tracts, through local ordinances.

100.1.4.10 Secure critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through local ordinances.

100.1.4.12 Secure scrub-shrub habitats for SGCN through local ordinances.

100.1.4.13 Encourage municipal laws regulating domestic pets that may predate on wildlife.

100.1.4.14 Adopt/pass local ordinances which require assessing and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.3 Develop policies that will promote the long term protection of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates.

100.3.0.5 Develop policies that will promote improved and secure habitat connections between conserved SGCN habitats.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.11 Develop policies that will ensure the protection and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

100.3.0.12 Develop policies that promote the preservation and protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.15 Develop policies that promote protecting and restoring scrub-shrub habitats to benefit shrub-dependent SGCN.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.20 Develop policies and/or regulations that prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

100.3.0.21 Develop policies that minimize wildlife road mortality through: 1) Requiring the integration of wildlife passages into all new and repaired roads, in particular those areas that will connect SGCN habitats, 2) Requiring current fish/wildlife passages be improved and maintained in perpetuity, 3) Supporting seasonal road closures, in particular for unimproved roads, 4) Supporting projects that work to improve connectivity of SGCN habitats such as land conservation through acquisition or other means.

100.3.0.31 Create or expand tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMPs.

100.3.0.32 Coordinate regulations across agencies to maximize availability of and enrollment in existing Forestry Stewardship Programs (e.g., "Woodland Stewards", Farm Bill, partners, etc.) to maintain and/or improve forest habitat.

100.3.0.36 Create legislation to limit the amount of plastic from shopping bags in circulation and re-instate incentives for citizens bringing their own shopping bag to grocery store.

100.3.0.40 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.45 Increase the controlled burn season to focus on restoring vegetative communities.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.48 Propose new State law or regulation mandating that a State-level "development impact fee" be assessed on all new development approved by municipalities (via the Municipal Land Use Law processes), and dedicate such monies to the development and implementation of regional Habitat Conservation Plans (or existing plans/programs serving the same regional function).

100.3.0.49 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address the issue of disturbance to habitat or species as a result of human activities (e.g., construction, bridge maintenance, road work, etc.).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.53 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded rights-of-way corridors associated with energy transport/transmission.

100.3.0.54 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded surface mining areas.

100.3.0.57 Develop regulations that when implemented will improve and secure habitat connections between conserved SGCN habitats.

100.3.0.58 Develop regulations that when implemented will promote the expansion of acreages and enhancement of the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.62 Develop regulations that when implemented will protect existing old-growth forest stands with large trees and/or stands that are being actively managed for old growth forests, in particular those within large, contiguous forest tracts.

100.3.0.63 Develop regulations that when implemented will preserve and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.65 Develop regulations that when implemented will protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

100.3.0.68 Develop regulations that when implemented will prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

100.3.0.69 Develop regulations that when implemented will minimize wildlife road mortality.

100.3.0.71 Develop regulations for licensing, permitting, or certification of Nuisance Wildlife Control Operators (NWCOs) that handle removal/exclusion of protected wildlife, such as bats and snakes, to ensure that proper methods are followed and that occurrences are reported.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100.3.0.73 Develop regulations that would exempt the conversion of lawns to native vegetation (beneficial to wildlife) from local lawn ordinances.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.2 Create a policy that requires the NJ DEP to incorporate scientific information regarding climate change and sea level rise (e.g., predictions, habitat management/acquisition efforts to enhance resilience to inundation) on their websites and to work with other government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

100.4.0.3 Develop policies for mandatory buffer strips on preserved farmlands and state-owned agricultural lands.

100.4.0.4 Create a policy that requires the use of wildlife habitat and corridor mapping products for both regulatory use when conducting project reviews and planning/siting new or expanded rights-of-way projects.

100.4.0.8 Develop a white paper addressing the impacts that existing, new or expanded rights-of-way have upon wildlife, wildlife habitats and habitat connectivity.

100.4.0.9 Develop and implement policies to minimize the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats in order to benefit wildlife.

100.4.0.12 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.4.0.13 Develop policies for different circumstances (e.g., roadsides and medians, riparian, aquatic and terrestrial habitats) that outline appropriate habitat/vegetation management strategies and schedules to minimize risks to and benefit wildlife.

100.4.0.16 Develop policies to implement habitat management strategies that will increase the structural diversity surrounding areas used for energy, mining, and transportation and service corridors which include but are not limited to the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-

100.4.0.17 Develop policies to implement habitat management strategies, including prescribed burns, that will increase the structural diversity on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies to control and reduce the impacts of invasive, non-native species in order to increase structural habitat diversity.

100.4.0.18 Develop policies to minimize the extent of infrastructure associated with energy and service corridors or areas (e.g., wind and solar farms, pipelines, utility lines) and that require the implementation of habitat management strategies that will increase the structural diversity in the area including (e.g., the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides).

100.4.0.19 Develop regulations that will minimize the creation of new barriers, remove or replace current barriers with appropriately-sized systems to accommodate wildlife dispersal, and to minimize road widening and traffic volume increases within critical wildlife habitat areas.

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Timber Rattlesnake

Focal species that comprise this Conservation Target:

Timber Rattlesnake

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:

1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.1.1.2 Loss, alteration and/or degradation of habitat.

1.1.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.

1.1.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.

1.1.1.5 Impervious surfaces can lead to a decrease in water recharge.

1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.1.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:

1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.2.1.2 Loss, alteration and/or degradation of habitat.

1.2.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.

1.2.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.

1.2.1.5 Impervious surfaces can lead to a decrease in water recharge.

1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.2.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats:

1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.3.1.2 Loss, alteration and/or degradation of habitat.

1.3.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.

1.3.1.4 Impervious surfaces can lead to a decrease in water recharge.

1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.3.1.6 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture (Avg. Score: 2.00)

NJ Specific Threats:

2.1.1.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.1.3 Conversion of agricultural landscape that results in increased erosion, runoff, and chemical and thermal pollution decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.1.2 Small-holder Farming (Avg. Score: 1.00)

NJ Specific Threats:

2.1.2.2 Fragments terrestrial and aquatic habitats.

2.1.2.4 Agricultural practices (e.g., mechanized, row-crop agriculture) can cause direct mortality to wildlife when harvesting takes places.

2.1.3 Agro-industry (Avg. Score: 2.00)

NJ Specific Threats:

2.1.3.2 Fragments terrestrial and aquatic habitats.

2.1.3.3 Agricultural practices (e.g., mechanized, row-crop agriculture) can render lands unsuitable for most wildlife due to soil degradation and erosion.

2.2 Wood and Pulp Plantations

2.2.1 Small Holder (Avg. Score: 2.00)

NJ Specific Threats:

2.2.1.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.2.1.2 Tree harvesting can cause direct mortality to wildlife, especially if done during peak activity periods or vulnerable life stages (e.g., denning, nesting, gestation/birthing, basking, roosting, pre-volancy, etc.).

2.2.2 Agro-industry Plantations (Avg. Score: 2.00)

NJ Specific Threats:

2.2.2.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.2.2.2 Tree harvesting can cause direct mortality to wildlife, especially if done during peak activity periods or vulnerable life stages (e.g., denning, nesting, gestation/birthing, basking, roosting, pre-volancy, etc.).

2.3 Livestock Farming and Ranching

2.3.2 Small-holder Grazing (Avg. Score: 1.00)

NJ Specific Threats:

2.3.2.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.2.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.2.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

2.3.3 Agro-industry Grazing (Avg. Score: 2.00)

NJ Specific Threats:

2.3.3.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.3.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.3.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

3 Energy Production and Mining

3.1 Oil and Gas Facilities and Pipelines

3.1.1 Distribution processes of petroleum and other liquid hydrocarbons (Avg. Score: 2.00)

NJ Specific Threats:

3.1.1.1 Fragments terrestrial and aquatic habitats.

3.1.1.2 Loss, alteration and/or degradation of habitat.

3.1.1.3 Increased risk of oil spills.

3.1.1.4 Increased noise pollution.

3.1.1.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.

3.1.1.6 Increased risk of collision between marine mammals, sea turtles and fish and the marine-based structures/facilities.

3.1.2 Natural gas distribution processes (Avg. Score: 2.00)

NJ Specific Threats:

3.1.2.1 Fragments terrestrial and aquatic habitats.

3.1.2.2 Loss, alteration and/or degradation of habitat.

3.1.2.3 Increased risk of gas leaks and explosions.

3.1.2.4 Increased noise pollution.

3.1.2.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.

3.1.2.6 Increased risk of collision between marine mammals, sea turtles and fish and the marine-based structures/facilities.

3.2 Mining and Quarrying

3.2.2 Surface Mining - Rock Quarry (and sand quarries) (Avg. Score: 2.00)

NJ Specific Threats:

3.2.2.1 Fragments terrestrial and aquatic habitats.

3.2.2.2 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

3.2.2.3 Increased risk of vehicle strikes/mortality to wildlife.

3.3 Renewable Energy

3.3.1 Wind Power (Avg. Score: 2.00)

NJ Specific Threats:

3.3.1.2 Fragments terrestrial habitats.

3.3.1.3 Loss, alteration and/or degradation of habitat.

3.3.1.4 Increased commercial infrastructure.

3.3.2 Solar Power (Avg. Score: 3.00)

NJ Specific Threats:

3.3.2.1 Fragments terrestrial habitats.

3.3.2.2 Loss, alteration and/or degradation of habitat.

3.3.2.3 Increased commercial infrastructure.

3.4 Conventional Power Plants

3.4.0 Conventional Power Plants (Avg. Score: 3.00)

NJ Specific Threats: 3.4.0.2 Loss, alteration and/or degradation of habitat due to new or the expansion of current facilities.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats: 4.1.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species and inhibiting dispersal of non-volant animals, reducing gene flow.

4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.1.1.3 Re-establishment of abandoned railroad lines may displace wildlife, in particular, less mobile species using the area to fulfill critical life history requirements.

4.1.1.4 Re-establishment of abandoned railroad lines may increase the risk of direct mortality on wildlife.

4.1.2 Movement of cars and other vehicles on roads and railroads (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats: 4.1.2.1 Increased vehicle traffic increases the risk of wildlife mortality from strikes.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads (Avg. Score: 2.00)

NJ Specific Threats: 4.2.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species, inhibiting dispersal of non-volant animals, reducing gene flow, and creating barriers to fish when service line-associated roads cross streams (e.g., bridges, culverts, fords, etc.).

4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

4.2.1.4 Lines that cross or run parallel to streams result in a loss or reduction of vegetated riparian buffers and streamside shading, affecting water quality and in-stream habitat for aquatic biota.

4.2.2 Management of rights-of-way or communication tower facilities and/or their associated access roads (Avg. Score: 2.00)

NJ Specific Threats: 4.2.2.1 Improper or poorly scheduled vegetation management can cause direct mortality to and may reduce productivity of wildlife.

5 Biological Resource Use

5.1 Hunting and Collecting Terrestrial Animals

5.1.1 Intentional Use (Avg. Score: 3.00)

NJ Specific Threats: 5.1.1.1 Illegal collection of wildlife can have detrimental impacts on populations.

5.1.3 Persecution/Control (Avg. Score: 3.00)

NJ Specific Threats: 5.1.3.1 Wanton killing of perceived dangerous and/or undesirable animals.

5.2 Gathering Terrestrial Plants

5.2.2 Unintentional effects (Avg. Score: 1.00)

NJ Specific Threats: 5.2.2.1 Stepping on nests or young/hatchling animals.

5.2.3 Control (Avg. Score: 1.00)

NJ Specific Threats: 5.2.3.2 Clearing of scrub-shrub vegetation [and snags] diminishes cover and nesting habitat.

5.2.3.3 Removal of riparian or near-stream vegetation alters water quality and in-stream habitat for aquatic organisms by reducing streamside shading, increasing bank erosion, and affecting the natural filtering ability of trees, shrubs, and grasses.

5.3 Logging and Wood Harvesting

5.3.1 Intentional Use (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats:

5.3.1.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.1.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.1.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.1.6 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices in Atlantic White Cedar stands may destroy a unique wildlife wetland habitat that is difficult, and takes time, to restore.

5.3.2 Intentional Use (large scale) (Avg. Score: 2.00)

NJ Specific Threats:

5.3.2.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.2.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.2.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.2.6 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices in Atlantic White Cedar stands may destroy a unique wildlife wetland habitat that is difficult, and takes time, to restore.

5.3.3 Unintentional effects (subsistence/small scale) (Avg. Score: 2.00)

NJ Specific Threats:

5.3.3.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.3.2 Poorly planned/implemented tree harvesting adjacent to waterways and vernal pools can lead to increased water temperatures, soil erosion and sedimentation, and reduces the potential for woody debris within the aquatic system, leading to negative impacts on wildlife.

5.3.4 Unintentional effects (large scale) (Avg. Score: 2.00)

NJ Specific Threats:

5.3.4.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4.2 Extensive infrastructure and larger equipment requirements present a potential risk of direct injury/mortality to wildlife.

5.3.4.3 Poorly planned/implemented tree harvesting adjacent to waterways and vernal pools can lead to increased water temperatures, soil erosion and sedimentation, and reduces the potential for woody debris within the aquatic system, leading to negative impacts on wildlife.

5.3.4.4 Infrastructure and/or equipment use may result in subtle changes to drainage patterns, adversely affecting vernal pool and wetland hydrology.

5.3.4.5 Lack of appropriate, sustainable forest management can lead to a decrease in forest habitat diversity, degraded habitat for many forest species, the loss of habitat for early-successional species, and/or the loss of unique habitats for species that need canopy breaks and multi-aged tree composition to fulfill various life history requirements.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized) (Avg. Score: 2.00)

NJ Specific Threats:

6.1.1.1 Inappropriate use of off-road vehicles creates new roads/trails which fragments habitat.

6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.

6.1.1.3 Increased risk of harassment that results in a change in wildlife behavior and/or direct mortality from vehicle strikes.

6.1.1.4 Increased noise pollution.

6.1.1.6 Off-road vehicles can be a mechanism of transference of wildlife diseases and invasive plant species if gear and apparel are not properly sanitized between sites.

6.1.5 Wildlife observation and photography (Avg. Score: 2.00)

NJ Specific Threats:

6.1.5.1 Improperly conducted recreational activities may disrupt normal wildlife behaviors which can result in reduced reproductive success or survival, abandonment of critical sites, etc.

6.1.5.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.1.6 Recreational use of cliffs, rocks and ridgelines (Avg. Score: 3.00)

NJ Specific Threats:

6.1.6.1 Recreational rock-climbing and rock-scrambling can cause reduced reproductive success or reproductive failure for wildlife by disrupting normal reproductive behaviors and/or reduce breeding success by forcing them into suboptimal habitats.

6.1.6.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.1.6.3 Recreational use of rock outcrops and ridgelines by hikers and bikers can lead to direct mortality through wanton killing or incidental take, and alter natural behaviors, reducing breeding and/or foraging success.

6.1.7 Other (Avg. Score: 2.00)

NJ Specific Threats:

6.1.7.2 Human presence in sensitive areas may introduce wildlife diseases or pathogens into the system.

6.2 Military Exercises

6.2.1 Military exercises (Avg. Score: 2.00)

NJ Specific Threats:

6.2.1.1 Military testing and training exercises may inflict disturbance and potential physical harm to wildlife.

6.2.1.3 Lack of opportunity for non-federal wildlife managers to influence activities on military bases may result in detrimental impacts to SGCN and/or missed opportunities to engage in projects that benefit SGCN.

6.3 Work and Other Activities

6.3.1 Unauthorized research projects at significant habitats (Avg. Score: 2.00)

NJ Specific Threats:

6.3.1.1 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.1.2 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.1.3 Activities conducted without proper precautions may disturb and disrupt normal wildlife behaviors, which may impact reproductive success or survival, cause abandonment of critical sites, etc.

6.3.2 Authorized research projects at significant habitats (Avg. Score: 2.00)

NJ Specific Threats: 6.3.2.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.2.3 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.2.4 Activities conducted without proper precautions may disturb and disrupt normal wildlife behaviors, which may impact reproductive success or survival, cause abandonment of critical sites, etc.

6.3.3 Other "work" unrelated to research (Avg. Score: 1.00)

NJ Specific Threats: 6.3.3.1 Construction projects may disrupt normal wildlife behavior which can result in reduced reproductive success or survival, abandonment of critical sites, etc. (e.g., bridge-nesting birds).

6.3.3.4 Workers may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

7 Natural Systems Modifications

7.1 Fire and Fire Suppression

7.1.1 Increase in Fire Frequency/Intensity (Avg. Score: 2.00)

NJ Specific Threats: 7.1.1.1 Increase in frequency and intensity of wild fires as a result of droughts and heat waves drying out vegetation and litter.

7.1.1.2 Increase in frequency of wild fires as a result of illegal activities.

7.1.1.3 Unnatural fire regimes occurring as a result of military exercises.

7.1.1.4 Lack of diversity in age structure and composition of vegetation due to expansive, frequent fires.

7.1.2 Suppression of Fire Frequency/Intensity (Avg. Score: 3.00)

NJ Specific Threats: 7.1.2.1 Shift in vegetative communities as a result of suppression of natural fires.

7.1.2.2 Lack of diversity in age structure and composition of vegetation due to the suppression of fire.

7.2 Dams and Water Management/Use

7.2.1 Abstraction of Surface Water (domestic use) (Avg. Score: 3.00)

NJ Specific Threats: 7.2.1.1 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.1.2 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.1.3 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, and eliminates shallow water habitats.

7.2.2 Abstraction of Surface Water (commercial use) (Avg. Score: 3.00)

NJ Specific Threats: 7.2.2.1 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, eliminates shallow water habitats, and disrupts/removes stream bottom habitat.

7.2.2.2 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.2.3 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.3 Abstraction of Surface Water (agricultural use) (Avg. Score: 3.00)

NJ Specific Threats: 7.2.3.1 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.3.2 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, and eliminates shallow water habitats.

7.2.3.3 Impounding water to create or expand bogs for cranberry farming leads to the loss of natural wetlands and the alteration of the natural hydrology in the area.

7.2.3.5 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.5 Abstraction of Ground Water (domestic use) (Avg. Score: 3.00)

NJ Specific Threats: 7.2.5.1 Heavy withdrawal of ground water for domestic use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.6 Abstraction of Ground Water (commercial use) (Avg. Score: 3.00)

NJ Specific Threats: 7.2.6.1 Heavy withdrawal of ground water for industrial and commercial use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.7 Abstraction of Ground Water (agricultural use) (Avg. Score: 3.00)

NJ Specific Threats: 7.2.7.1 Heavy withdrawal of ground water for agricultural use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.9 Small Dams (Avg. Score: 3.00)

NJ Specific Threats: 7.2.9.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.10 Large Dams (Avg. Score: 3.00)

NJ Specific Threats: 7.2.10.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.11 Dams (size unknown) (Avg. Score: 3.00)

NJ Specific Threats: 7.2.11.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.12 Culverts (Avg. Score: 1.00)

NJ Specific Threats: 7.2.12.1 Improper design, placement, installation and maintenance of culverts and other stream crossing structures can impede or prevent the movements of terrestrial organisms and can restrict or limit stream flow, impeding the movement of aquatic organisms along riparian corridors.

7.2.13 Stream Burial (Avg. Score: 1.00)

NJ Specific Threats: 7.2.13.1 Eliminates riparian habitats.

7.2.13.2 Eliminates in-stream habitat and water resources for wildlife.

7.2.13.3 Alters the hydrology and quality of downstream aquatic and riparian habitats.

7.3 Other Ecosystem Modifications

7.3.2 Inappropriate timing of mowing (Avg. Score: 2.00)

NJ Specific Threats: 7.3.2.1 Increased risk of direct mortality and/or reduced productivity of wildlife, as well as reduced use by migrating species.

7.3.3 Removal of coarse woody debris (streams, forests, scrub-shrub habitats) (Avg. Score: 2.00)

NJ Specific Threats:
- 7.3.3.2 Decreases habitat and/or corridor suitability due to limited or absent shelter and foraging habitat.
- 7.3.3.3 Removal of dead trees (snags), large felled logs (i.e., those > 12" dbh), and other downed woody material diminishes nesting, roosting, and sheltering options for wildlife, and increases the ease at which deer can browse regenerating vegetation.
- 7.3.3.4 Decreases available basking, shelter, and foraging habitats.

7.3.4 Lack of natural disturbance patterns or ecosystem functions due to species loss (Avg. Score: 1.00)

NJ Specific Threats:
- 7.3.4.5 The lack of forest disturbance minimizes the diversity of herbaceous vegetation and other shrubs and trees that need a lot of sunlight to grow.

7.3.5 Poor habitat management (Avg. Score: 3.00)

NJ Specific Threats:
- 7.3.5.1 Improper or poorly scheduled maintenance of man-made corridors (e.g., roadsides and medians) can cause direct mortality to and may reduce productivity of wildlife.
- 7.3.5.3 Vegetation clearing removes terrestrial and riparian corridors for animal movement, shelter, and resting areas.
- 7.3.5.4 Vegetation clearing or inappropriate alteration adjacent to aquatic habitats threatens aquatic species by degrading habitat and water quality (altering temperature and dissolved oxygen, increasing siltation and desiccation, etc.).
- 7.3.5.5 Habitat management that alters or removes vegetation without implementing long-term management increases the risk of invasive and exotic plants establishing themselves, outcompeting native vegetation.
- 7.3.5.6 Habitat management, including that which occurs on public and private lands, that does not consider timing and species' behaviors can result in the direct mortality and/or alteration or loss of habitat.
- 7.3.5.7 Improperly planned habitat management and/or mitigation efforts along roadsides and within the medians can attract wildlife and increase the risk of vehicle strikes.
- 7.3.5.9 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, eliminates shallow water habitats, and disrupts/removes stream bottom habitat.
- 7.3.5.10 Ditching, draining and filling of marshes and wetlands eliminates habitat and degrades the remaining surrounding areas for wildlife.
- 7.3.5.12 Lack of diversity in age structure and composition of vegetation due to lack of natural disturbances and/or vegetation management.
- 7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats:
- 8.1.1.1 Displace or outcompete native species for resources.
- 8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.
- 8.1.1.3 Invasive, non-native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.
- 8.1.1.4 Invasive, non-native animals increase the risk of predation on native animals and/or herbivory on native vegetation.
- 8.1.1.5 Invasive, non-native animals and plants increase the risk of introduction and transference of diseases

8.1.1.6 Invasive, non-native plants may create physical barriers for some species.

8.1.4 Invasive non-native terrestrial/wetland animals (Avg. Score: 1.00)

NJ Specific Threats: 8.1.4.1 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.4.2 Free-roaming and feral domestic animals such as cats and dogs causes direct mortality of wildlife and disturbance to wildlife breeding and resting areas.

8.1.5 Invasive non-native terrestrial/wetland plants (Avg. Score: 1.00)

NJ Specific Threats: 8.1.5.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.6 Invasive non-native fungal/bacterial diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.1.6.1 The introduction of non-native fungal and bacterial diseases threatens native populations and ecosystems.

8.2 Problematic Native Species/Diseases

8.2.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.2.1.1 Overabundant native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

8.2.1.2 Invasive pathogens and insects may increase in range and abundance as limiting factors (such as temperature) are altered as a result of climate change.

8.2.1.4 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.2.2 Named Species (Avg. Score: 1.00)

NJ Specific Threats: 8.2.2.2 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.4 Problematic Species/Diseases of Unknown Origin

8.4.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.4.1.1 Non-native or poorly understood diseases and parasites could potentially impact native animals.

8.4.2 Named Species (Avg. Score: 2.00)

NJ Specific Threats: 8.4.2.2 Diseases of unknown origin, such as snake fungal disease and Ranavirus, can cause significant mortality among native animal populations.

8.5 Viral/Prion-induced Diseases

8.5.1 Unspecified Species (Disease) (Avg. Score: 1.00)

NJ Specific Threats: 8.5.1.1 There is a large knowledge gap regarding the existence of, or potential for, other diseases impacting native wildlife.

8.5.2 Named Species (Disease) (Avg. Score: 2.00)

NJ Specific Threats: 8.5.2.1 Diseases such as West Nile Virus, arenavirus, sudden oak death, Avian Influenza, and snake fungal disease cause morbidity or mortality to native populations.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.1 Domestic and Urban Waste Water

9.1.1 Sewage (Avg. Score: 3.00)

NJ Specific Threats:

9.1.1.1 Degradation of aquatic and marine water quality and habitats by changing turbidity, flow and water chemistry.

9.1.1.3 Contaminants in sewage treatment effluents and Combined Sewer Overflows can cause developmental and behavioral abnormalities and reproductive failure in wildlife.

9.1.2 Run-off (Avg. Score: 3.00)

NJ Specific Threats:

9.1.2.1 Chemical fertilizers and nutrient run-off changes the pH in streams and ponds and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.1.2.2 Contaminants degrade aquatic and marine water quality and can bioaccumulate in benthic organisms, threatening wildlife by causing developmental and behavioral abnormalities and reproductive failure.

9.1.2.3 Contaminants from road runoff (oil, sediment, salt, etc.) impact native vegetation and the species that rely upon them, degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2 Industrial and Military Effluents

9.2.1 Oil Spills (Avg. Score: 2.00)

NJ Specific Threats:

9.2.1.1 Oil spills render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.1.2 Oil spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.1.3 Oil spills cause external oiling of wildlife and ingestion of oil, both of which can injure or kill wildlife.

9.2.2 Seepage from Mining (Avg. Score: 3.00)

NJ Specific Threats:

9.2.2.1 Contaminants from mining degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2.3 Other (Avg. Score: 3.00)

NJ Specific Threats:

9.2.3.1 Point and nonpoint source pollution such as polychlorinated biphenyls (PCBs), pesticides, heavy metals, and endocrine disrupting compounds (EDC's) into freshwater and marine systems pose threats to wildlife through direct contact and/or ingestion, and to aquatic species and their predators through bioaccumulation, impacting the reproductive success and neurological function of many avian and fish species.

9.2.3.2 Chemical spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.3.3 Chemical spills may render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.4 Other: Hydrofracturing (Avg. Score: 1.00)

NJ Specific Threats:

9.2.4.1 Contaminants from hydrofracturing degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2.4.2 Uncontrolled effluents escaping from hydrofracturing facilities can cause injury to wildlife and alter normal behaviors.

9.2.5 Other: Industrial toxic settling ponds (Avg. Score: 1.00)

NJ Specific Threats: 9.2.5.1 Surficial or open industrial effluent ponds can cause injury or death to wildlife that become exposed through ingestion or submersion.

9.3 Agricultural and Forestry Effluents

9.3.1 Nutrient Loads (Avg. Score: 3.00)

NJ Specific Threats: 9.3.1.1 Chemical fertilizers and nutrient run-off changes the pH in streams, ponds and wetlands and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.3.1.2 Animal waste degrades terrestrial and aquatic habitats, especially streams, ponds and wetlands, resulting in eutrophication, which disrupts oxygen and nutrient balances, and causes injury and mortality to aquatic organisms.

9.3.1.4 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades wetland and aquatic habitats with runoff, increasing sediment and nutrient loads and pH.

9.3.1.5 Conversion of native forests to plantations degrades wetland and aquatic habitats through increased runoff.

9.3.2 Soil Erosion and Sedimentation (Avg. Score: 3.00)

NJ Specific Threats: 9.3.2.1 Soil erosion, sedimentation and destruction of streambanks and riparian buffers degrade waters making them unsuitable for riparian-dependent wildlife.

9.3.2.2 Soil erosion and sedimentation limit the re-establishment of plants needed by terrestrial wildlife as cover and a food base.

9.3.2.3 Conversion of native forests to plantations degrades wetland and aquatic habitats through increased sedimentation.

9.3.3 Herbicides and Pesticides (Avg. Score: 3.00)

NJ Specific Threats: 9.3.3.1 Pesticides degrade terrestrial and aquatic habitats, especially streams, ponds and wetlands. Aquatic wildlife are particularly sensitive to these contaminants, which can cause developmental and behavioral abnormalities and reproductive failure. Some contaminants may bioaccumulate in predatory fish and birds and disrupt reproduction.

9.3.3.2 Use of rodenticides can cause secondary actions of injury and death to animals in the course of scavenging.

9.3.3.3 Use of pesticides can directly harm non-target species through direct contact and/or by reducing and/or contaminating their food supply.

9.3.4 Other (Avg. Score: 3.00)

NJ Specific Threats: 9.3.4.1 Spills, leaks or discharges of fuel, oil or other contaminant fluids from machinery or equipment used in the normal course of agricultural or forestry activities can degrade or destroy adjacent aquatic and terrestrial habitats and/or cause harm to non-target species (plants and animals).

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture (Avg. Score: 1.00)

NJ Specific Threats: 9.3.5.1 Use of pesticides, insecticides, and/or herbicides can directly harm non-target species, such as amphibians and beneficial invertebrates through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5.4 Improper use of current insecticides, such as those containing esfenvalerate, prallethrin, or piperonyl butoxide, or past use of pesticides containing chlordane still present in the soils, are toxic to various wildlife species, and can cause injury, mortality, or other effects that impair population viability.

9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.4 Garbage and Solid Waste

9.4.1 Direct hazards to wildlife (Avg. Score: 1.00)

NJ Specific Threats: 9.4.1.1 Wildlife may ingest garbage causing choking or impingement in the digestive system, or they may become physically entangled in it (e.g., plastic or abandoned fish nets); conditions that make them unable to feed or drink, cause them to suffocate or drown, or otherwise restrict the animal's movement making them more susceptible to predators, starvation or injury.

9.4.1.2 Garbage and solid waste destroys natural habitats and obstructs wildlife movements.

9.5 Air-Bourne Pollutants

9.5.1 Acid Rain (Avg. Score: 1.00)

NJ Specific Threats: 9.5.1.1 Causes acidification of water bodies, resulting in changes to aquatic and marine communities and reducing biodiversity, and creating conditions that are unsuitable for some aquatic (freshwater and marine) and semi-aquatic species that are sensitive to pH shifts.

9.5.6 Herbicides and Pesticides (Avg. Score: 2.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

9.6 Excess Energy

9.6.2 Thermal Pollution (Avg. Score: 1.00)

NJ Specific Threats: 9.6.2.2 Water temperature changes to aquatic systems can deter or preclude use by SGCN (e.g., alter habitat suitability for wildlife species, reduce prey base) or present stressors that are harmful if not fatal to wildlife.

9.6.3 Noise Pollution (Avg. Score: 1.00)

NJ Specific Threats: 9.6.3.1 Acute and chronic noise pollution in and adjacent to terrestrial and aquatic (marine and freshwater) environments could disrupt normal behaviors of wildlife such as migration, communication, feeding, eluding predators, resting and breeding, etc.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 1.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.2 Droughts

11.2.1 Droughts (Avg. Score: 2.00)

NJ Specific Threats: 11.2.1.1 Contribute to hardened soils, decreasing water recharge during rains and increasing the likelihood of flash floods during storms.

11.2.1.2 Lead to lower groundwater levels and therefore, less available water for people and habitats.

11.2.1.3 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

11.3 Temperature Extremes

11.3.1 Temperature extremes (Avg. Score: 2.00)

NJ Specific Threats: 11.3.1.1 Increasing temperatures may cause habitat loss and degradation by desiccating and/or raising the temperatures of small wetlands and streams leading to the loss of freshwater mussels and other aquatic species and species reliant upon these habitats.

11.3.1.2 Increased temperatures can negatively impact wetland, riverine, lacustrine and vernal pool-associated or -dependent wildlife by reducing flows, increasing water temperatures, lowering water levels and causing premature drying of vernal habitats.

11.3.1.4 Extremely low temperatures and/or extensive periods of unseasonably low temperatures during critical life history stages (e.g., hibernation, gestation/nesting) can alter animals' behaviors and decrease survivorship.

11.4 Storms and Flooding

11.4.1 Storms and flooding (Avg. Score: 1.00)

NJ Specific Threats: 11.4.1.1 Extreme storms and flooding events threaten aquatic and marine wildlife through habitat degradation and alteration, including alterations to off-shore or back-bay benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic and marine wildlife.

11.4.1.3 Increase risk of saltwater intrusion to freshwater habitats altering the water chemistry and potentially altering aquatic wildlife community.

11.4.1.4 Flood events alter river or stream morphology, benthic conditions and habitat availability for wildlife, cause bank erosion, and deposit sediments in floodplain wetlands altering wildlife habitat.

11.4.2 Increased rainfall (Avg. Score: 3.00)

NJ Specific Threats: 11.4.2.1 Extreme rain events threaten aquatic wildlife through habitat degradation and alteration, including alterations to benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic wildlife.

11.4.2.2 Extreme rain events can damage wildlife nesting and resting habitats, including impacts to avian eggs and chick and small mammal survivorship.

11.4.2.3 More frequent rain events can alter terrestrial and wetland vegetation communities as well as wetland hydrology, shifting wildlife community use.

11.6 Phenology Shifting or Alteration

11.6.2 Phenology shifts related to predator-prey ecology (Avg. Score: 1.00)

NJ Specific Threats: 11.6.2.1 Alters inter-specific relationships (e.g., competition, parasitism, predation) of wildlife, ultimately leads to detrimental impacts on the ecological system.

11.6.2.2 Shifts timing of species migration, breeding and hibernation, and available food resources, causes redistribution of species, or mortality for species that are unable to relocate due to their already isolated habitat or limited mobility.

11.6.3 Phenology shifts related to species redistribution (Avg. Score: 1.00)

NJ Specific Threats: 11.6.3.1 Shifts in timing of species migration, breeding and hibernation, and available food resources, as a result of wildlife range shifts driven by climate change.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 3.00)

NJ Specific Threats: 12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.2 Lack of up-to-date existing information (Avg. Score: 3.00)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.3 Need to answer research question (Avg. Score: 2.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.4 Need to develop new technique (Avg. Score: 2.00)

NJ Specific Threats:
- 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.
- 12.1.4.2 Improve and evaluate survey methods for species not easily detected through standard survey methods.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 1.00)

NJ Specific Threats:
- 12.3.0.1 Regulatory habitat protections within state land use regulations are spatially limited to specific geographic areas (e.g., Pinelands, Coastal Area) or geographic features (e.g., wetlands, streams) and so fail to protect critical habitats that exist outside of these regulated areas.
- 12.3.0.3 Lack of a licensing program and standards for NJ Nuisance Wildlife Control Operators (NWCOs) leads to inadequate controls over handling of wildlife and lack of reporting of non-game/SGCN species (and all wildlife) encountered in nuisance situations.
- 12.3.0.6 Certain geographic or habitat features, such as vernal pools and headwater wetlands or streams, may be too small, mischaracterized, or misidentified to benefit from regulatory protection.
- 12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.
- 12.3.0.9 Prescribed burns implemented by the NJ Forest Fire Service are constrained by State air quality regulations to a timeframe where seasonal weather conditions are less than ideal for effective burning. As a result, the Forest Fire Service is limited in the number of overall prescribed burns it can implement to restore habitat for wildlife.
- 12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 1.00)

NJ Specific Threats:
- 12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.
- 12.4.0.3 Lack of internal understanding regarding beneficial habitat impacts of storm events leads to policies and practices that reverse or decrease such beneficial effects (e.g., beach-filling, shoreline hardening, “hazard” tree and log removal from forests, etc.
- 12.4.0.5 Bureau of Forest Fire Management policy has traditionally implemented prescribed burns on State lands for the sole purpose of public safety (i.e., addressing hazard fuel reduction), missing opportunities to burn in a manner that would additionally manage habitat for ecological diversity.
- 12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 2.00)

NJ Specific Threats:
- 14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.
- 14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 2.00)

NJ Specific Threats:

14.2.1.1 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various forest management practices.

14.2.1.2 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various aquatic and riparian management practices.

14.2.1.5 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various wetland management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 1.00)

NJ Specific Threats:

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.4 Secure and promote the protection, restoration, and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts through incentive programs.

1.2.1.5 Secure and promote the protection/restoration of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through incentive programs.

1.2.1.6 Secure and promote the protection/restoration of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers through incentive programs.

1.2.1.7 Secure and promote the protection/restoration of fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.9 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing Forestry Stewardship Programs.

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.12 Create incentives (non-monetary and/or monetary) for land developers to redevelop abandoned areas (e.g., shopping centers, office complexes) to minimize the loss of natural habitats and reduce the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.18 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and land managers to control and reduce the impacts of invasive, native and non-native species in order to increase structural habitat diversity.

1.2.1.19 Create incentives for federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to farmers, woodland landowners, and private landowners to adopt and/or endorse consistent BMPs concerning controlled burns to maintain and/or improve wildlife habitat.

1.2.1.20 Coordinate across government agencies and non-government organizations to create or expand upon tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMP's.

1.2.1.23 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to provide cost shares and/or plan approvals for management based on management approaches and prescriptions.

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

1.2.1.28 Create incentives to implement dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

2 Direct Management of Natural Resources

2.2 Dam and barrier removal

2.2.1 Culvert work

2.2.1.1 Replace existing barriers to wildlife movement with and/or install appropriately-sized systems to accommodate wildlife dispersal.

2.3 Fire management

2.3.2 Fuel reduction

2.3.2.1 Prevent wildfires by reducing natural fuel (e.g., leaf litter).

2.3.3 Prescribed burning

2.3.3.1 Evaluate different management techniques of prescribed burns that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

2.3.3.2 Conduct prescribed burning in Northern New Jersey forests to maintain and regenerate a mosaic of upland forest habitats.

2.3.3.3 Conduct prescribed burning to improve wildlife habitat.

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.5 Implement biologically safe and appropriate control/management strategies, and where appropriate, eradication strategies to reduce the impacts and/or limit the distribution of invasive and/or non-native plant species within or near aquatic systems using methods that will provide the most protection to the aquatic and riparian ecological system, and minimize disturbance to the soil and wildlife. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.8.0.6 Implement long-term management of invasive and/or non-native plants to help maintain functioning ecological systems and biological diversity, and to enhance travel corridors. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.3 Restore and/or enhance habitats to benefit urban-associated SGCN.

2.10.0.4 Restore and/or enhance suitable travel corridors connecting conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.8 Protect significant natural and/or unique communities by implementing best management practices when conducting habitat restoration strategies.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.12 Create and/or maintain scrub-shrub habitats through revegetation efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.15 Restore and/or enhance terrestrial and aquatic habitats proximate to but not adjacent to roads and other transportation corridors for terrestrial-bound SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.10.0.17 Maintain, enhance and/or restore SGCN-inhabited/used freshwater wetlands through restoring submerged aquatic vegetation.

2.10.0.21 Restore and/or enhance understory habitats that suppress invasive species and provide critical resources and enhance sheltering, foraging, and nesting cover for wildlife.

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.10.0.24 Use NJ's CHANJ mapping and guidance to establish vegetation and enhance or create corridors between fragmented habitats with similar vegetation, slope, soils, structure, etc. to ensure vegetative integrity is maintained to allow wildlife to safely disperse, and corridors are buffered with natural habitats to minimize disturbance to wildlife within the corridors.

2.10.0.25 Enhance SGCN fish habitats through aquatic and riparian vegetation restoration.

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.11.0.3 Create suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats through vegetation management.

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through vegetation management.

2.11.0.6 Reclaim degraded rare species habitats by conducting vegetation management needed to restore habitat value for the documented/target SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.8 Maintain, enhance and/or restore biologically appropriate buffers for SGCN-inhabited/used freshwater wetlands through vegetation management.

2.11.0.13 Implement best management practices (BMPs), protective strategies, and guidelines for vegetation management to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.11.0.14 Conduct vegetation management adjacent to roads for SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.11.0.16 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.11.0.18 Implement forest management/silvicultural strategies that promote the development of new old-growth forests and/or minimize the loss of old-growth forest stands with large trees and within large, contiguous tracts.

2.11.0.19 Implement forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN.

2.11.0.20 Create and/or maintain scrub-shrub habitats through management efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.11.0.21 Minimize the degradation, alteration and/or changes in hydrology of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and subsequent disturbances to and behavioral changes of wildlife by maintaining or enhancing these areas and biologically appropriate buffers through habitat management and/or revegetation or restoration efforts.

2.11.0.23 Implement appropriate habitat management actions in areas where natural disturbances, such as wildfire, have been precluded.

2.11.0.24 Conduct vegetation management adjacent to aquatic habitats following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.25 Conduct vegetation management along access roads following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.26 Conduct vegetation management along roadsides and medians, avoiding peak activity periods for wildlife, that enhances wildlife dispersal naturally and safely across roads and similar barriers to/between terrestrial and/or aquatic habitats.

2.11.0.27 Conduct vegetation management for target shrub- or young forest-dependent SGCN following BMPs to minimize the risk of the establishment of invasive and non-native plants.

2.11.0.28 Conduct vegetation management in agricultural areas following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.29 Conduct vegetation management on transportation and service corridors (i.e., rights-of-way) following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.31 In areas where vegetative communities are shifting due to fire suppression and controlled burns are not feasible, manage vegetation to improve wildlife habitat.

2.11.0.32 Increase structural habitat diversity around and when feasible, within agricultural landscapes by managing vegetation for a variety of species, in particular, those farms that have removed scrub-shrub habitat and/or fragmented forests, and by implementing ecologically best practices (e.g., no-till farming, maintaining hedgerows, buffer set-asides, etc.).

2.11.0.33 Increase structural habitat diversity by implementing long-term vegetation management to minimize the potential for the establishment of invasive and/or non-native plants that may outcompete native vegetation.

2.11.0.34 Increase structural habitat diversity by managing residential, commercial and recreational areas' landscapes for a variety of species. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.35 Increase structural habitat diversity by managing vegetation adjacent to aquatic habitats in a manner that provides a buffer from runoff and erosion and a microclimate to stabilize seasonal temperatures to benefit a variety of aquatic and semi-aquatic species.

2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.

2.11.0.37 Increase structural habitat diversity by minimizing the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats which benefits wildlife.

2.11.0.38 Increase structural habitat diversity in and around horse/livestock farms by managing vegetation for a variety of species, in particular, in and around farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

2.11.0.39 Increase structural habitat diversity in and around solar farms by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.40 Increase structural habitat diversity surrounding areas used for energy, mining, and transportation and service corridors by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides, and avoid managing habitat during the breeding seasons for ground-nesting birds, reptiles, amphibians and small mammals.

2.11.0.41 Increase structural habitat diversity through the implementation of a variety of vegetation management practices such a prescribed burns (either increasing or decreasing their frequency depending on the site and objective), plantings, etc. that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.42 Increase structural habitat diversity within wind farms for terrestrial bound and low-flying species and around wind farms for other wildlife by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.43 Manage forests to increase variation in age structure and composition using BMPs that promote and maintain functioning ecological forest-based systems and biological diversity.

2.11.0.45 Regularly and/or rotationally create young forest habitat in targeted areas to maintain and regenerate a mosaic of upland forest habitats that will benefit shrub- and young forest-dependent species.

2.12 Water management

2.12.1 Ditch plugs

2.12.1.1 Implement best management practices (BMPs), protective strategies, and guidelines for ditch plugging to maintain and enhance healthy, resident and migratory SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.12.3 Drainage

2.12.3.2 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) such as removing drainage ditches to restore natural stream flows and wetlands, that benefit wildlife inhabiting these areas.

2.12.3.3 Remove tile drains and drainage ditches to improve wetland hydrology and restore natural stream flows during appropriate times to avoid sensitive periods (e.g., nesting, denning, roosting) and minimizes harm to wildlife, particularly SGCN.

2.12.3.4 Expand the acreages and enhance the effective size of SGCN habitats by reclaiming/restoring adjacent, degraded habitats by removing tile drains and drainage ditches.

2.12.3.6 Protect significant natural and/or unique communities by and when removing tile drains and drainage ditches.

2.12.3.10 Use tile drain and drainage ditch removal to create feeding and roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

2.12.3.11 Implement best management practices (BMPs), protective strategies, and guidelines when removing tile drains and drainage ditches to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.13 Wildlife damage management

2.13.0 Nuisance fish and wildlife damage

2.13.0.4 Investigate the effects of mosquito control methods on freshwater aquatic and semi-aquatic SGCN including but not limited to, amphibian, fish, dragonfly, and damselfly populations.

2.13.0.5 Investigate the impacts of human-subsidized and/or naturally occurring predator species on SGCN to assess the need for integrated wildlife damage management techniques (e.g., predator exclosures, fish blockages, electric fence, culls) and/or policy changes on state land management that minimize the impacts of human-subsidized predators.

2.13.0.8 Implement and assess management strategies to control and reduce the impacts of detrimental species and diseases that pose threats to native wildlife or communities.

2.14 Wildlife disease management

2.14.0 Wildlife disease strategy development and investigation

2.14.0.1 Investigate diseases/pathogens impacting SGCN and/or their habitats.

2.14.0.2 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

2.14.0.4 Conduct long-term monitoring of diseases in vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts.

2.14.0.5 Assess the impacts of diseases on the life cycles of wildlife.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.6 Conduct long-term studies on resident and migratory SGCN to determine if there are changes to the populations' demography (productivity, survival, dispersal) and/or to their critical and/or supporting habitats (i.e., diminishing in value, acreage or connectivity, etc.), in particular changes that would not maintain SGCN at viable levels for species populations. Update data and GIS maps; provide updated information to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.11 Develop, implement and evaluate the effectiveness of town plans that avoid impacts to SGCN species and their habitats.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.14 Identify areas with invasive, aquatic plants and animals and collect a detailed baseline assessment of the species' status and distribution. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort. Researchers and contractors performing Forest Stewardship Inventories and/or Plans on state lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.0.0.15 Conduct long-term monitoring of areas identified as having invasive, aquatic plants and animals to track the species' status/progress over time with or without the implementation of management strategies. Areas without management strategies should be assessed and prioritized for management/control. Areas where management strategies are being implemented should include an assessment of the management effort and identify/recommend and implement necessary changes to improve its success. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort.

3.0.0.19 Identify the presence and status (e.g., functioning, structure, slated for removal, etc.) of existing dams and culverts within and/or that may impact SGCN and their habitats, and create a database that includes a GIS component identifying the locations of such structures and their status. Share this information with appropriate organizations and/or agencies evaluating the benefits and risks of such structures on SGCN and their habitats.

3.0.0.20 Once baseline data identifying and describing the status of existing dams and culverts have been gathered, conduct evaluations at a variety of sites to determine whether the benefits of culvert and dam creation or removal outweigh the risks to SGCN species and their habitats, and if other variables/conditions specific to individual sites/locations result in a different outcome. Identify and target appropriate dams and culverts for removal and/or reconstruction to minimize harm to SGCN species and their habitats.

3.0.0.23 Identify (through wildlife and aquatic system surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and research water quality parameters for all [types of] aquatic systems for various SGCN populations.

3.0.0.26 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species including objectives and guidance pertaining to and the condition/status of critical and supporting habitats.

3.0.0.27 Evaluate the effectiveness of strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals through research and monitoring. Develop and provide NJ DEP and other appropriate governing agencies/commissions a summary of findings and recommendations to improve such efforts.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.4 Conduct long-term monitoring of the impacts of contaminants to vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.2.0.5 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

3.2.0.6 Develop, implement and conduct studies to evaluate the effectiveness of methods implemented to reduce road mortality of wildlife (e.g. wildlife underpasses, road closures).

3.2.0.7 Track (via a database that includes a GIS component) and research problematic species and diseases to determine their distribution, impacts on SGCN wildlife/wildlife communities, and develop potential control measures.

3.2.0.8 Implement and conduct long-term monitoring of control measures aimed at minimizing the impacts of problematic species and/or diseases to evaluate the effectiveness of such efforts and to identify and incorporate additional strategies as appropriate.

3.2.0.10 Evaluate the effectiveness of sanitation/decontamination protocols in minimizing the transference of wildlife diseases and invasive plant species.

3.2.0.12 Investigate the impacts of ORV use and ORV-created noise on terrestrial and aquatic wildlife behavior and the impact of direct mortality from vehicle strikes. Integrate this information when mapping undeveloped roads and trails to identify potentially sensitive areas in northern NJ forests.

3.2.0.21 Investigate the effects of mosquito control methods on freshwater aquatic and semi-aquatic SGCN including but not limited to, amphibian, fish, dragonfly, and damselfly populations.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.2 Age, size and sex structure

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.3 Baseline inventory

3.2.3.6 Investigate the feasibility and potential for success of conducting genetic rescue through translocation and/or reintroduction of animals into suitable habitat that was historically occupied to increase genetic diversity and reconnect isolated populations. Methods of investigation should include, but are not limited to, thorough literature reviews, expert opinions, identifying potential pitfalls (e.g., species' fidelity to their range or critical areas), and an examination of historic and current SGCN population distribution and suitable habitat availability.

3.2.3.7 Identify roads or portions of roads, paved or unimproved (through site surveys, land use/land cover assessments and analyses, review of available data, enlistment of species experts, etc.) with high incidences of road mortality and/or presence of snakes, turtles, medium-sized and large mammals. Conduct assessments of the roads and incorporate information into a database that includes descriptions (e.g., qualifiers to help prioritize the roads' risk to wildlife) and a GIS component of the locations of such areas. Share this information with appropriate organizations and/or agencies working to implement measures (e.g., wildlife passages, road closures) to minimize the risk to these species.

3.2.4 Food habits

3.2.4.1 Monitor and investigate the populations and health of SGCN prey/food resources for those SGCN whose populations are thought to be limited due wholly or in part to a lack of food resources or toxins in food resources.

3.2.5 Genetics

3.2.5.1 Investigate the feasibility and potential for success of conducting genetic rescue through translocation and/or reintroduction of animals into suitable habitat that was historically occupied to increase genetic diversity and reconnect isolated populations. Methods of investigation should include, but are not limited to, thorough literature reviews, expert opinions, identifying potential pitfalls (e.g., species' fidelity to their range or critical areas), and an examination of historic and current SGCN population distribution and suitable habitat availability.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.6 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) that could, through revegetation and/or enhancement efforts, become suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN.

3.3.1.7 Map and prioritize existing and potential areas for early succession forest management. Share the results with state, county and municipal planners.

3.3.1.8 Assess the availability and suitability of forest habitats for SGCN species (particularly reptiles and amphibians, birds, pollinators, and tiger beetles) in southern forests since Superstorm Sandy.

3.3.1.9 Inventory forests throughout northern New Jersey to develop a baseline characterization of the structure and composition of habitats and identify deficient forest habitat types.

3.3.1.16 Gather "best information" for spatial modeling and update/create a current model/depiction of anticipated habitat shifts from sea-level rise, flooding, etc.

3.3.1.17 Identify and map undeveloped roads and trails in all conserved forests, and create a database of locations. Integrate information regarding potentially sensitive areas.

3.3.1.18 Conduct an assessment using available data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels.

3.3.1.19 Identify and codify legal ORV access areas on state (and if appropriate, other conserved) lands. Provide GIS mapping to the landowner for potential use in directing such recreational activities.

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.2 Monitoring

3.3.2.1 Evaluate the effectiveness of forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.5 Conduct long-term monitoring of water quality of SGCN aquatic habitats (and aquatic systems feeding into those habitats) to evaluate protection and management efforts to reduce, if not eliminate, chemical contamination, siltation, eutrophication, and other forms of pollution/contamination of aquatic systems.

3.3.2.8 Evaluate the effectiveness of current prescribed burning practices on Pinelands dependent species.

3.3.2.9 Investigate the effectiveness of various silviculture techniques for enhancing forests for forest-dependent SGCN.

3.3.2.10 Evaluate the efficacy and success of different management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.3.2.14 Research and evaluate the effectiveness of water quality management practices on water-dependent and semi-dependent SGCN, particularly those practices associated with permitting or mitigation actions.

3.3.2.15 Investigate the effectiveness of management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.3.2.20 Once a system is developed for reporting and qualifying new locations of invasive species, develop, implement and monitor/evaluate invasive species removal strategies at identified locations. Priority should be given to those areas critical to SGCN and/or contain unique and/or rare plant communities supporting SGCN and/or other fish/wildlife species.

3.3.2.24 Conduct regular inventories of forests throughout northern New Jersey to characterize the changing structure and composition of habitats and monitor forest conditions.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.3 Develop/improve management techniques that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.7 Develop/improve forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

3.5.3.8 Develop best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5.3.9 Develop strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.14 Develop aquaculture practices in the coastal areas that are compatible with the recovery of SGCN.

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.3.16 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.3.19 Work with foresters to develop prescribed burning practices for Pinelands dependent species that increase or maintain habitat quality for these species in the Pinelands.

3.5.3.20 Develop guidance on various silviculture techniques for enhancing forests for forest-dependent SGCN.

3.5.3.21 Develop management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.23 Revise water quality management practices based on research on water-dependent and semi-dependent SGCN, particularly when associated with permitting or mitigation actions.

3.5.3.24 Based on research, modify management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.1 Develop studies to evaluate management strategies to improve the availability of prey/food resources for SGCN whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources. Monitor and investigate the management strategies over time to determine success and/or the need to revise methods.

3.5.4.5 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

3.5.4.6 Investigate the feasibility of mitigating for the impacts of contaminants to vulnerable wildlife, particularly SGCN. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.5.4.7 Investigate the feasibility and potential for success of conducting genetic rescue through translocation and/or reintroduction of animals into suitable habitat that was historically occupied to increase genetic diversity and reconnect isolated populations. Methods of investigation should include, but are not limited to, thorough literature reviews, expert opinions, identifying potential pitfalls (e.g., species' fidelity to their range or critical areas), and an examination of historic and current SGCN population distribution and suitable habitat availability.

3.5.4.9 Conduct studies to evaluate the impacts of roads on SGCN and develop, implement and conduct studies to evaluate the effectiveness of methods to reduce road mortality of wildlife (e.g. wildlife underpasses, road closures).

3.5.4.13 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.4.14 Develop and implement agreements, and update existing agreements, with government agencies regarding the protection of critical SGCN habitats (e.g., significant breeding populations of beach nesting birds, colonial waterbird nesting areas, bat colonies, etc.).

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.17 Investigate new, non-invasive techniques for SGCN population evaluation through literature review, expert opinion, trial studies (if low risk), etc.

3.5.4.18 Investigate the effectiveness of survey techniques through selected "ground truthing" and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

3.5.4.21 Develop BMPs to address problematic species and diseases of unknown origin.

3.5.4.22 Investigate the efficacy of implementing strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities.

4 Education

4.1 Educator/Instructor training

4.1.0 Public education

4.1.0.1 Provide educational resources and training programs to private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

4.1.1 Aquatic resource education

4.1.1.1 Provide educational resources and training programs to teachers in aquatic resource education that includes information regarding climate change and sea-level rise for incorporation into the class curriculum and/or as the focus of school field trips.

4.1.1.2 Provide educational resources and training programs to teachers in aquatic resource education that includes information regarding how coastal stabilization negatively impacts wildlife by preventing natural processes for incorporation into the class curriculum and/or as the focus of school field trips.

5 Facilities and Areas

5.15 Wildlife Management Areas

5.15.6 Roads

5.15.6.2 Clearly post areas/trails where vehicle access is not permitted.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.1 Enhance and increase the effective size of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates by securing adjacent habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.3 Secure and protect riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.4 Secure and protect fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.6 Secure and protect old-growth forest stands with large trees and/or stands that are approaching or being actively managed for old growth forests, in particular those within large, contiguous forest tracts, through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.7 Secure and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.8 Secure and protect scrub-shrub habitats for SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.1 Promote the protection of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates and enhance these lands by increasing the effective size through conservation area designations of stopover habitats and adjacent private lands.

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.3 Increase the protection of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through conservation area designations.

6.3.0.4 Promote the protection of fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through conservation area designations.

6.3.0.6 Promote the protection of old-growth forest stands with large trees and/or stands that are approaching or being actively managed for old growth forests, in particular those within large, contiguous forest tracts, through conservation area designations.

6.3.0.7 Promote the protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through conservation area designations.

6.3.0.8 Promote the protection of scrub-shrub habitats for SGCN through conservation area designations.

6.4 Private lands agreements

6.4.0 Private land agreement strategies

6.4.0.1 Enter into private lands agreements to expand control burns on private lands, in particular those adjacent to conserved lands to improve SGCN habitats.

7 Law Enforcement

7.1 Law enforcement

7.1.3 Sub-national Level

7.1.3.2 Increase the number of law enforcement officers tending to wildlife issues to a reasonable number to sufficiently cover the State and marine waters.

7.1.4 Scale Unspecified

7.1.4.1 Improve enforcement of policies and/or regulations that promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

7.1.4.3 Increase law enforcement presence proximate to sensitive areas [e.g., avian nesting sites, in particular rookeries, and reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively)] to deter human activity and subsequent disturbance to SGCN.

7.1.4.6 Recruit law enforcement to assist in the protection and enhancement of SGCN populations, in particular endangered species, through improved awareness of species through trainings, partnerships, and other methods. Information should include but is not limited to: 1) Issues concerning illegal collection of reptiles, 2) Persecution of rare snakes, 3) Illegal recreational activities on public lands (e.g., off-road vehicles) and their impact on wildlife, 4) Identification of sensitive areas, critical sites and/or "hot-spots" for collection.

7.1.4.7 Increase law enforcement presence to enforce regulations governing recreational activities (e.g., the use of personal watercraft and off road vehicles, caving, rock climbing, etc.) on conserved lands and within other sensitive habitats, and discourage activities that cause harm or disturbance to vegetation, wetlands, fish and wildlife.

7.1.4.9 Implement policies that improve and secure habitat connections between conserved SGCN habitats.

7.1.4.10 Implement policies that promotes expanding acreages and enhances the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.14 Implement policies that protect existing and developing old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

7.1.4.15 Implement policies that preserve and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

7.1.4.16 Implement policies that protect and restore riparian areas.

7.1.4.17 Improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

7.1.4.19 Implement policies that protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

7.1.4.22 Implement policies and/or regulations that prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

7.1.4.23 Implement policies that minimize wildlife road mortality.

7.1.4.25 Encourage the enforcement of municipal laws regulating domestic pets that may predate on wildlife.

7.1.4.26 Educate law enforcement personnel that there may be unauthorized research projects taking place and to encourage them to investigate any activities that appear to be harmful to wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.2 Develop a team of personnel from government entities, conservation organizations and other stakeholders engaged in oil/gas spill response for marine and freshwater habitats to develop a feasible plan for oil spill response and/or to amend NJ's current oil spill response plan that clearly outlines each organizations responsibilities and an assessment and location list of available equipment for boom deployment during oil spills.

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.1.0.4 Engage government agencies, conservation partners and other stakeholders in constructive dialogues encouraging them to influence policy change and the creation of incentives through a habitat bill and/or municipal ordinances for backyard habitat.

8.1.0.11 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting sportsmen's organizations and fisheries, as well as public constituents, addressing the unintended effects abandoned fishing gear, tackle and crab pots can have on wildlife, and promote the collection and/or reporting of abandoned items and their locations.

8.1.0.13 Engage DOD in a constructive dialogue regarding strategies to minimize disturbances to all SGCN (i.e., beyond their federal requirements) from forest management and other practices on their lands.

8.1.0.14 Engage DOD in a constructive dialogue regarding strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities.

8.1.0.15 Engage government agencies, conservation partners and other stakeholders in discussions encouraging and supporting the creation of laws and policies requiring vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

8.1.0.16 Engage local governments in discussions regarding the importance of them adopting/passing ordinances which require assessing and addressing secondary impacts (i.e., ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

8.1.0.17 Engage municipalities in constructive dialogue to identify and minimize destruction of areas prioritized for early succession forest management.

8.1.0.18 Engage NJDOT, NJ Transit Authority and other road management entities, wildlife conservation organizations/agencies (e.g., Division of Fish and Wildlife, New Jersey Conservation Foundation, Conserve Wildlife Foundation of NJ), and communities and citizens in discussions regarding the importance of and methods to enhance habitat connectivity, and work together to develop feasible strategies for ensuring that wildlife can disperse naturally and safely across roads and similar barriers to terrestrial and/or aquatic habitats.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.21 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation human-subsidized and/or overabundant, native species cause to local nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.26 Coordinate across federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to woodland landowners to adopt or endorse consistent best management practices concerning controlled burns to maintain and/or improve forested habitat for wildlife.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.33 Engage government agencies, conservation partners and other land managers, communities, landowners, and commercial and industrial stakeholders in discussions regarding the importance of protecting and methods to protect priority wetlands beyond the levels afforded through regulation by maintaining and/or restoring optimal biological buffers around wetlands.

8.1.0.34 Work with the NJ Education Association and Department of Education to design curriculum and outdoor experimental learning opportunities, and provide training to teachers on implementation of these activities.

8.1.0.37 Enlist landowners and NJ citizens in the protection of and survey efforts for SGCN, in particular rare species, by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management and wildlife-related volunteer programs.

8.1.0.38 Engage partners, stakeholders and land managers in constructive dialogue promoting forest stewardship for SGCN that use core forests and forested corridors.

8.1.0.40 Encourage researchers, land managers, naturalists and enthusiasts to follow proper procedures for the coordination and/or permitting of research/management activities involving wildlife and sensitive habitats, and discourage activities that alter vegetation or wetlands, or cause harm or disturbance to wildlife.

8.1.0.42 Engage citizens, wildlife observers and photographers through discussions and distributable information regarding the importance of and encouraging implementing responsible and ethical behavior when observing wildlife by developing an alliance of wildlife photographers and widely circulating recommendations on how to reduce impact.

8.1.0.44 Engage conservation partners, stakeholders, government agencies and other land stewards in constructive dialogues encouraging their inclusion of controlled burns in forest and other stewardship plans.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.6 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners, land managers and local communities to discourage the presence of managed cat colonies and trap, neuter and release programs in wildlife habitats.

8.3.0.7 Develop and provide (or otherwise make publicly available) educational programs and/or materials that describe the negative impacts of off-road vehicles and watercraft use in and adjacent to critical SGCN habitats, and the importance of confining such activities to more appropriate locations and/or seasons.

8.3.0.8 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate recreationists and encourage landowners to eliminate garbage in the vicinity of suitable wildlife habitat, in particular SGCN habitat. Information should include the detrimental impacts garbage may have on various wildlife species.

8.3.0.9 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners and land managers to include only native plants in landscaping and restoration projects. Provide information to assist them in detecting problematic establishment of invasive, non-indigenous plants.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.11 Develop and provide (or otherwise make publicly available) educational programs and/or materials to the public, wildlife-related professionals, foresters, etc., that describe the value of species that are often feared (e.g., snakes, bats, spiders, Allegheny woodrat) and/or deemed a "nuisance" (e.g., squirrel, deer, snapping turtle), and therefore, persecuted by people. Include information on tolerance, proper identification, eviction from human dwellings, how to minimize the animal's presence on the property, and/or how to live in harmony with the animal.

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.14 Develop an educational outreach program using a variety of media to ensure maximizing the distribution of information, in particular targeting sportsmen's organizations and fisheries, regarding the unintended effects abandoned fishing gear, tackle and crab pots can have on wildlife, including non-target species.

8.3.0.19 Develop an educational outreach program for the public on the devastating effects predators can have on native nesting wildlife.

8.3.0.24 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

8.3.0.26 Develop educational outreach programs for private and public landowners and land managers regarding the importance of and how to manage core forests and forested corridors in a way that will be beneficial for SGCN, particularly endangered, threatened and special concern species.

8.3.0.27 Develop educational outreach programs for public and private landowners and land managers regarding the importance of structural habitat diversity, methods to increase diversity, and/or incentive programs available to increase habitat diversity.

8.3.0.29 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about the importance of maintaining a vegetative buffer along riparian and aquatic habitats to intercept storm water runoff and minimize soil erosion.

8.3.0.30 Develop educational outreach programs for private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

8.3.0.31 Develop an educational outreach program for landowners and citizens on the secondary impacts of rodenticides on predators and scavengers.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.4 Develop a plan that directs the creation of new impoundments and/or the expansion of bogs for cranberry farming within or immediately adjacent to critical forested habitats in a manner that minimizes impacts on the natural hydrology of the watershed and subsequently, the natural wetlands in the area.

9.1.0.5 Develop a plan that directs the creation or expansion of energy or utility rights-of-way in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.6 Develop a plan that directs the creation or expansion of roads and railroads or the re-establishment of abandoned railroads within and adjacent to critical forested habitats in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.7 Develop a plan that directs the maintenance of or new channelization of forested streams and rivers in a manner that minimizes impacts of the aquatic ecological system and adjacent forest

9.1.0.8 Develop a plan that focuses on strategies for oil pipelines to avoid sensitive habitats that would be highly impacted by oil spills.

9.1.0.9 Develop a plan that focuses on strategies to minimize the creation of renewable energy farms (e.g., solar, wind) and related infrastructures within and their impacts on forested habitats and the wildlife community.

9.1.0.10 Develop a plan that focuses on strategies to minimize the impacts of mining on critical forested habitats.

9.1.0.11 Develop a plan that focuses on strategies to minimize the impacts of power plants on critical forested habitats and the wildlife community.

9.1.0.13 Develop a plan to minimize agriculture that would result in groundwater withdrawal in critical forested areas.

9.1.0.14 Develop a plan to minimize development that would result in groundwater withdrawal in critical forested areas.

9.1.0.15 Develop a plan to minimize fragmentation of terrestrial and aquatic habitats by roads.

9.1.0.16 Develop a plan to minimize new lawnscapes and preserve natural vegetation within and adjacent to critical forest areas.

9.1.0.18 Develop a plan to minimize the effects of road widening and traffic volume increases within critical wildlife habitat areas using CHANJ products.

9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

9.1.0.20 Develop a plan to minimize the impacts of existing agricultural properties adjacent to and the conversion of forest habitats (terrestrial and aquatic, within or adjacent to critical forests) to agriculture, grazing areas/livestock farms, and plantations.

9.1.0.21 Develop a plan to minimize the use of any-sized dam in critical forested areas.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.23 Develop a plan to mitigate the effects of transportation barriers by using CHANJ products.

9.1.0.24 Develop a plan to prevent livestock from entering water bodies in critical forested habitats.

9.1.0.25 Develop a plan to prevent the conversion of forested stream buffers to pastures in critical forested habitats.

9.1.0.27 Develop a plan to use wildlife-appropriate culverts in critical forested areas.

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.31 Develop wetland restoration plans that consider the life history and needs of wildlife occupying targeted habitats.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.2 Organizational strategic and CMS planning

9.2.1 Organizational strategic and operational planning

9.2.1.1 Identify and codify legal ORV access areas on state lands.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.6 Amend NJ's current oil spill response plan to 1) expand the geographic area addressed, 2) expand the targeted species impacted and in need of recovery, and 3) revise current and integrate new actions into the plan as needed.

9.3.1.7 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.10 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.14 Create species management plans that will promote the protection and where appropriate, the development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

9.3.1.15 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.1.16 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.2 Listed species recovery planning

9.3.2.1 Develop proactive species recovery plans for all endangered and threatened species including guidance and objectives pertaining to critical and supporting habitat to meet and maintain recovery goals.

9.3.3 Habitat management planning

9.3.3.5 Develop a management plan using forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

9.3.3.6 Develop a management plan for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

9.3.3.7 Develop a management plan to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

9.3.3.8 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.3.13 Develop a management plan that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas and prevents or ameliorates near-term impacts of climate change throughout the State, but in particular within the coastal and Delaware Bay areas.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.16 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.3.17 Develop a management plan for prescribed burning that will benefit Pinelands dependent species and increase or maintain habitat quality for these species in the Pinelands.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.21 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.3.22 Create management plans to minimize and/or prevent wildlife road mortality that will incorporate wildlife passages in conjunction with barrier fencing and, where possible, seasonal closures. Aquatic-associated passages must avoid disturbance to the natural streambeds and riparian habitat, permit high volumes of water to flow freely, and provide adequate travel corridors for terrestrial wildlife, while maintaining stream flow for fish passage. Bridges that span rivers and streambeds and include floodplain habitat on either side of the span to provide travel corridors for terrestrial wildlife are preferred over culverts.

9.3.3.23 Create forest management plans that will promote the protection and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

9.3.3.24 Develop a plan to improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

9.3.3.28 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.3.29 Develop habitat management plans aimed at reducing or eliminating negative impacts of ORVs.

9.3.3.32 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3.34 Include controlled burn prescriptions in forest and stewardship plans to improve wildlife habitat.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.3 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.9 Review strategies for creating or enhancing connectivity (e.g., installing appropriately-sized wildlife passages) between wetlands to allow wildlife to disperse naturally and safely.

11.1.1.10 Use CHANJ mapping in reviews of proposed energy, mining, transportation and utility service companies/agencies' projects to attempt to maintain habitat connectivity and reduce fragmentation, and identify potential impacts of the projects.

11.1.1.12 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed solar farm projects to reduce habitat fragmentation and minimize impacts on wildlife.

11.1.1.13 Use the best available science (species data, habitat present, wind farm layout options, wind blade impacts on migratory species, location of migration routes, etc.) when conducting regulatory reviews of proposed wind farm projects to minimize impacts on migratory and resident wildlife and reduce habitat fragmentation.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.2.2 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.2.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into the environmental review process to help establish policies and plans that minimize the impact of aquaculture on fish and wildlife.

11.1.2.4 Review strategies for creating or enhancing connectivity (e.g., installing appropriately-sized wildlife passages) between wetlands to allow wildlife to disperse naturally and safely.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.2 Provide technical support to public and private landowners and land managers for controlling invasive, native and non-native plant species in order to increase structural habitat diversity.

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.4 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the secondary impacts of rodenticides on predators and scavengers.

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.7 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on the importance of maintaining habitat connectivity, minimizing fragmentation, and the use of CHANJ products to help them target areas for such planning.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.11 Provide educational resources, training programs, and on-the-ground guidance to private and public landowners and land managers on the benefits of and for creating young forest and early succession habitat for SGCN.

11.2.0.13 Provide educational resources and technical support to public landowners, private landowners with sufficient acreage, and land managers to promote the protection and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

11.2.0.14 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters), and to enhance or restore biologically appropriate buffers.

11.2.0.15 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and landowners about the importance of retaining and in an effort to protect, create, enhance and/or restore vegetation along aquatic habitats.

11.2.0.16 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

11.2.0.18 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats.

11.2.0.19 Provide educational resources and technical support to public and private landowners and land managers to promote the protection and/or enhancement of scrub-shrub habitats for SGCN.

11.2.0.21 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates to promote the protection and/or enhancement of those adjacent habitats to increase the effective size of the migratory habitat.

11.2.0.22 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

11.2.0.23 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to SGCN habitats to promote the protection and/or enhancement of those adjacent habitats to increase the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and that connect conserved SGCN habitats.

11.2.0.24 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers on how to manage vegetated roadside areas (e.g., mowing, brush-hogging, etc.) on a schedule that avoids peak activity periods for wildlife and therefore, minimizes harm.

11.2.0.25 Provide educational resources, training programs, and on-the-ground guidance to resource managers regarding the assessment of and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) related to residential and commercial development.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.0.29 Provide educational resources, training programs, and on-the-ground guidance to Nuisance Wildlife Control Operators (NWCOs), conservation partners, and the public in conserving snake populations by advising proper removal from buildings, exclusion methods from buildings, and improving the public's understanding and acceptance of snakes.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.1 Engage partners and stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.3 Provide educational resources, training programs, and on-the-ground guidance to DOD to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop and implement forest management and other practices that minimize disturbances to SGCN (i.e., beyond their federal requirements).

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

11.2.2 With private landowners

11.2.2.1 Provide technical support to farming operations and woodland landowners on ways to decrease clean farming (edge-to-edge) practices and create ecotones to benefit bobwhite and other species dependent on early successional habitat.

100 Law and Policy

100. Legislation

100.1.3 Sub-national Level

100.1.3.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.3.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.4 County and Local

100.1.4.1 Enhance critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates through the local ordinances of adjacent private lands to increase the effective size of the habitat.

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.3 Expand the acreages and enhance the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN through local ordinances.

100.1.4.4 Secure wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and biologically appropriate buffers through local ordinances.

100.1.4.5 Secure SGCN-inhabited/used freshwater wetlands and biologically appropriate buffers through local ordinances.

100.1.4.9 Secure existing and developing old-growth forest stands with large trees, in particular those within large, contiguous forest tracts, through local ordinances.

100.1.4.10 Secure critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through local ordinances.

100.1.4.11 Secure riparian areas through local ordinances.

100.1.4.12 Secure scrub-shrub habitats for SGCN through local ordinances.

100.1.4.13 Encourage municipal laws regulating domestic pets that may predate on wildlife.

100.1.4.14 Adopt/pass local ordinances which require assessing and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.5.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.5.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into state/local policy to minimize the impact of aquaculture on fish and wildlife.

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.1 Develop (and/or improve) policies and/or regulations that will promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

100.3.0.3 Develop policies that will promote the long term protection of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates.

100.3.0.5 Develop policies that will promote improved and secure habitat connections between conserved SGCN habitats.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.11 Develop policies that will ensure the protection and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

100.3.0.12 Develop policies that promote the preservation and protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.13 Develop policies that will promote protecting and restoring riparian areas.

100.3.0.14 Develop policies and/or regulations that increase the protective buffers of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) to biologically appropriate distances to benefit SGCN that rely upon these habitats and improve the function of the [associated] aquatic systems.

100.3.0.15 Develop policies that promote protecting and restoring scrub-shrub habitats to benefit shrub-dependent SGCN.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.20 Develop policies and/or regulations that prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

100.3.0.21 Develop policies that minimize wildlife road mortality through: 1) Requiring the integration of wildlife passages into all new and repaired roads, in particular those areas that will connect SGCN habitats, 2) Requiring current fish/wildlife passages be improved and maintained in perpetuity, 3) Supporting seasonal road closures, in particular for unimproved roads, 4) Supporting projects that work to improve connectivity of SGCN habitats such as land conservation through acquisition or other means.

100.3.0.31 Create or expand tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMPs.

100.3.0.32 Coordinate regulations across agencies to maximize availability of and enrollment in existing Forestry Stewardship Programs (e.g., "Woodland Stewards", Farm Bill, partners, etc.) to maintain and/or improve forest habitat.

100.3.0.36 Create legislation to limit the amount of plastic from shopping bags in circulation and re-instate incentives for citizens bringing their own shopping bag to grocery store.

100.3.0.40 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.

100.3.0.42 Fully adopt the former Storm water Management Rules' 300ft buffer requirements into the Flood Hazard Area Control Act Rules.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.45 Increase the controlled burn season to focus on restoring vegetative communities.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.48 Propose new State law or regulation mandating that a State-level "development impact fee" be assessed on all new development approved by municipalities (via the Municipal Land Use Law processes), and dedicate such monies to the development and implementation of regional Habitat Conservation Plans (or existing plans/programs serving the same regional function).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.53 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded rights-of-way corridors associated with energy transport/transmission.

100.3.0.54 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded surface mining areas.

100.3.0.57 Develop regulations that when implemented will improve and secure habitat connections between conserved SGCN habitats.

100.3.0.58 Develop regulations that when implemented will promote the expansion of acreages and enhancement of the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.62 Develop regulations that when implemented will protect existing old-growth forest stands with large trees and/or stands that are being actively managed for old growth forests, in particular those within large, contiguous forest tracts.

100.3.0.63 Develop regulations that when implemented will preserve and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.64 Develop regulations that when implemented will protect and restore riparian areas.

100.3.0.65 Develop regulations that when implemented will protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

100.3.0.68 Develop regulations that when implemented will prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

100.3.0.69 Develop regulations that when implemented will minimize wildlife road mortality.

100.3.0.71 Develop regulations for licensing, permitting, or certification of Nuisance Wildlife Control Operators (NWCOs) that handle removal/exclusion of protected wildlife, such as bats and snakes, to ensure that proper methods are followed and that occurrences are reported.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100.3.0.73 Develop regulations that would exempt the conversion of lawns to native vegetation (beneficial to wildlife) from local lawn ordinances.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.2 Create a policy that requires the NJ DEP to incorporate scientific information regarding climate change and sea level rise (e.g., predictions, habitat management/acquisition efforts to enhance resilience to inundation) on their websites and to work with other government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

100.4.0.3 Develop policies for mandatory buffer strips on preserved farmlands and state-owned agricultural lands.

100.4.0.4 Create a policy that requires the use of wildlife habitat and corridor mapping products for both regulatory use when conducting project reviews and planning/siting new or expanded rights-of-way projects.

100.4.0.8 Develop a white paper addressing the impacts that existing, new or expanded rights-of-way have upon wildlife, wildlife habitats and habitat connectivity.

100.4.0.9 Develop and implement policies to minimize the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats in order to benefit wildlife.

100.4.0.12 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.4.0.13 Develop policies for different circumstances (e.g., roadsides and medians, riparian, aquatic and terrestrial habitats) that outline appropriate habitat/vegetation management strategies and schedules to minimize risks to and benefit wildlife.

100.4.0.16 Develop policies to implement habitat management strategies that will increase the structural diversity surrounding areas used for energy, mining, and transportation and service corridors which include but are not limited to the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-

100.4.0.17 Develop policies to implement habitat management strategies, including prescribed burns, that will increase the structural diversity on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies to control and reduce the impacts of invasive, non-native species in order to increase structural habitat diversity.

100.4.0.18 Develop policies to minimize the extent of infrastructure associated with energy and service corridors or areas (e.g., wind and solar farms, pipelines, utility lines) and that require the implementation of habitat management strategies that will increase the structural diversity in the area including (e.g., the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides).

100.4.0.19 Develop regulations that will minimize the creation of new barriers, remove or replace current barriers with appropriately-sized systems to accommodate wildlife dispersal, and to minimize road widening and traffic volume increases within critical wildlife habitat areas.

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.22 Work with NJ DEP's Division of Land Use Regulation to ensure protection of listed species and their habitats during stream cleaning events.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Vernal Pond & Pond Breeders

Focal species that comprise this Conservation Target:

Carpenter Frog	Eastern Spadefoot	Eastern Tiger Salamander
New Jersey Chorus Frog	Pine Barrens Treefrog	

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 2.40)

NJ Specific Threats:

- 1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.1.1.2 Loss, alteration and/or degradation of habitat.
- 1.1.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.
- 1.1.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.
- 1.1.1.5 Impervious surfaces can lead to a decrease in water recharge.
- 1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.
- 1.1.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 2.40)

NJ Specific Threats:

- 1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.2.1.2 Loss, alteration and/or degradation of habitat.
- 1.2.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.
- 1.2.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.
- 1.2.1.5 Impervious surfaces can lead to a decrease in water recharge.
- 1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.
- 1.2.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 1.20)

NJ Specific Threats:

- 1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.3.1.2 Loss, alteration and/or degradation of habitat.
- 1.3.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.

1.3.1.4 Impervious surfaces can lead to a decrease in water recharge.

1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.3.1.6 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture (Avg. Score: 1.40)

NJ Specific Threats:

2.1.1.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.1.3 Conversion of agricultural landscape that results in increased erosion, runoff, and chemical and thermal pollution decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.1.2 Small-holder Farming (Avg. Score: 1.00)

NJ Specific Threats:

2.1.2.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.2.2 Fragments terrestrial and aquatic habitats.

2.1.2.3 Agricultural practices (e.g., mechanized, row-crop agriculture) can render lands unsuitable for most wildlife due to soil degradation and erosion.

2.1.2.4 Agricultural practices (e.g., mechanized, row-crop agriculture) can cause direct mortality to wildlife when harvesting takes places.

2.1.3 Agro-industry (Avg. Score: 1.40)

NJ Specific Threats:

2.1.3.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.3.2 Fragments terrestrial and aquatic habitats.

2.1.3.3 Agricultural practices (e.g., mechanized, row-crop agriculture) can render lands unsuitable for most wildlife due to soil degradation and erosion.

2.1.3.5 Loss of ecotones by implementing clean farming (edge-to-edge) practices degrades habitat for early successional wildlife.

2.2 Wood and Pulp Plantations

2.2.1 Small Holder (Avg. Score: 2.00)

NJ Specific Threats:

2.2.1.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.2.1.2 Tree harvesting can cause direct mortality to wildlife, especially if done during peak activity periods or vulnerable life stages (e.g., denning, nesting, gestation/birthing, basking, roosting, pre-volancy, etc.).

2.2.1.3 Improper design or restoration of skid roads may result in ponded areas that serve as habitat sinks for amphibians.

2.2.2 Agro-industry Plantations (Avg. Score: 1.00)

NJ Specific Threats:

2.2.2.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.2.2.2 Tree harvesting can cause direct mortality to wildlife, especially if done during peak activity periods or vulnerable life stages (e.g., denning, nesting, gestation/birthing, basking, roosting, pre-volancy, etc.).

2.2.2.3 Improper design or restoration of skid roads may result in ponded areas that serve as habitat sinks for amphibians.

2.3 Livestock Farming and Ranching

2.3.2 Small-holder Grazing (Avg. Score: 1.00)

NJ Specific Threats:

2.3.2.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

2.3.2.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.2.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

2.3.3 Agro-industry Grazing (Avg. Score: 1.00)

NJ Specific Threats:

2.3.3.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.3.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

3 Energy Production and Mining

3.1 Oil and Gas Facilities and Pipelines

3.1.1 Distribution processes of petroleum and other liquid hydrocarbons (Avg. Score: 1.00)

NJ Specific Threats:

3.1.1.1 Fragments terrestrial and aquatic habitats.

3.1.1.2 Loss, alteration and/or degradation of habitat.

3.1.1.3 Increased risk of oil spills.

3.1.1.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.

3.1.2 Natural gas distribution processes (Avg. Score: 1.80)

NJ Specific Threats:

3.1.2.1 Fragments terrestrial and aquatic habitats.

3.1.2.2 Loss, alteration and/or degradation of habitat.

3.1.2.3 Increased risk of gas leaks and explosions.

3.1.2.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.

3.2 Mining and Quarrying

3.2.2 Surface Mining - Rock Quarry (and sand quarries) (Avg. Score: 2.00)

NJ Specific Threats:

3.2.2.1 Fragments terrestrial and aquatic habitats.

3.2.2.2 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

3.2.2.3 Increased risk of vehicle strikes/mortality to wildlife.

3.3 Renewable Energy

3.3.1 Wind Power (Avg. Score: 0.60)

NJ Specific Threats:

3.3.1.2 Fragments terrestrial habitats.

3.3.1.3 Loss, alteration and/or degradation of habitat.

3.3.2 Solar Power (Avg. Score: 2.00)

NJ Specific Threats: 3.3.2.1 Fragments terrestrial habitats.

3.3.2.2 Loss, alteration and/or degradation of habitat.

3.3.2.3 Increased commercial infrastructure.

3.4 Conventional Power Plants

3.4.0 Conventional Power Plants (Avg. Score: 1.00)

NJ Specific Threats: 3.4.0.2 Loss, alteration and/or degradation of habitat due to new or the expansion of current facilities.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 2.60)

NJ Specific Threats: 4.1.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species and inhibiting dispersal of non-volant animals, reducing gene flow.

4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.1.2 Movement of cars and other vehicles on roads and railroads (large and small scale) (Avg. Score: 2.60)

NJ Specific Threats: 4.1.2.1 Increased vehicle traffic increases the risk of wildlife mortality from strikes.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads (Avg. Score: 2.00)

NJ Specific Threats: 4.2.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species, inhibiting dispersal of non-volant animals, reducing gene flow, and creating barriers to fish when service line-associated roads cross streams (e.g., bridges, culverts, fords, etc.).

4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

4.2.1.4 Lines that cross or run parallel to streams result in a loss or reduction of vegetated riparian buffers and streamside shading, affecting water quality and in-stream habitat for aquatic biota.

4.2.2 Management of rights-of-way or communication tower facilities and/or their associated access roads (Avg. Score: 2.20)

NJ Specific Threats: 4.2.2.1 Improper or poorly scheduled vegetation management can cause direct mortality to and may reduce productivity of wildlife.

5 Biological Resource Use

5.1 Hunting and Collecting Terrestrial Animals

5.1.1 Intentional Use (Avg. Score: 1.20)

NJ Specific Threats: 5.1.1.1 Illegal collection of wildlife can have detrimental impacts on populations.

5.1.2 Unintentional effects (Avg. Score: 1.00)

NJ Specific Threats: 5.1.2.2 Disruption of normal wildlife behavior.

5.2 Gathering Terrestrial Plants

5.2.2 Unintentional effects (Avg. Score: 1.00)

NJ Specific Threats: 5.2.2.1 Stepping on nests or young/hatchling animals.

5.2.3 Control (Avg. Score: 1.00)

NJ Specific Threats:

5.2.3.2 Clearing of scrub-shrub vegetation [and snags] diminishes cover and nesting habitat.

5.2.3.3 Removal of riparian or near-stream vegetation alters water quality and in-stream habitat for aquatic organisms by reducing streamside shading, increasing bank erosion, and affecting the natural filtering ability of trees, shrubs, and grasses.

5.3 Logging and Wood Harvesting

5.3.1 Intentional Use (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats:

5.3.1.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.1.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.1.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.1.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.1.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.1.6 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices in Atlantic White Cedar stands may destroy a unique wildlife wetland habitat that is difficult, and takes time, to restore.

5.3.2 Intentional Use (large scale) (Avg. Score: 2.00)

NJ Specific Threats:

5.3.2.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.2.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.2.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.2.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.2.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.2.6 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices in Atlantic White Cedar stands may destroy a unique wildlife wetland habitat that is difficult, and takes time, to restore.

5.3.3 Unintentional effects (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats:

5.3.3.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.3.2 Poorly planned/implemented tree harvesting adjacent to waterways and vernal pools can lead to increased water temperatures, soil erosion and sedimentation, and reduces the potential for woody debris within the aquatic system, leading to negative impacts on wildlife.

5.3.4 Unintentional effects (large scale) (Avg. Score: 2.00)

NJ Specific Threats:
- 5.3.4.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.
- 5.3.4.2 Extensive infrastructure and larger equipment requirements present a potential risk of direct injury/mortality to wildlife.
- 5.3.4.3 Poorly planned/implemented tree harvesting adjacent to waterways and vernal pools can lead to increased water temperatures, soil erosion and sedimentation, and reduces the potential for woody debris within the aquatic system, leading to negative impacts on wildlife.
- 5.3.4.4 Infrastructure and/or equipment use may result in subtle changes to drainage patterns, adversely affecting vernal pool and wetland hydrology.
- 5.3.4.5 Lack of appropriate, sustainable forest management can lead to a decrease in forest habitat diversity, degraded habitat for many forest species, the loss of habitat for early-successional species, and/or the loss of unique habitats for species that need canopy breaks and multi-aged tree composition to fulfill various life history requirements.

5.4 Fishing and Harvesting of Aquatic Resources

5.4.1 Intentional Use (subsistence/small scale) (Avg. Score: 0.20)

NJ Specific Threats:
- 5.4.1.3 Collection of fish for food, bait, or aquarium trade can lead to population exploitation.
- 5.4.1.4 Illegal collection of aquatic and semi-aquatic wildlife can have detrimental impacts on populations.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized) (Avg. Score: 2.00)

NJ Specific Threats:
- 6.1.1.1 Inappropriate use of off-road vehicles creates new roads/trails which fragments habitat.
- 6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.
- 6.1.1.3 Increased risk of harassment that results in a change in wildlife behavior and/or direct mortality from vehicle strikes.
- 6.1.1.6 Off-road vehicles can be a mechanism of transference of wildlife diseases and invasive plant species if gear and apparel are not properly sanitized between sites.

6.1.5 Wildlife observation and photography (Avg. Score: 1.00)

NJ Specific Threats:
- 6.1.5.1 Improperly conducted recreational activities may disrupt normal wildlife behaviors which can result in reduced reproductive success or survival, abandonment of critical sites, etc.
- 6.1.5.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.2 Military Exercises

6.2.1 Military exercises (Avg. Score: 1.00)

NJ Specific Threats:
- 6.2.1.1 Military testing and training exercises may inflict disturbance and potential physical harm to wildlife.
- 6.2.1.3 Lack of opportunity for non-federal wildlife managers to influence activities on military bases may result in detrimental impacts to SGCN and/or missed opportunities to engage in projects that benefit SGCN.

6.3 Work and Other Activities

6.3.1 Unauthorized research projects at significant habitats (Avg. Score: 2.00)

NJ Specific Threats:
- 6.3.1.1 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.1.2 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.2 Authorized research projects at significant habitats (Avg. Score: 2.00)

NJ Specific Threats:

6.3.2.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.2.3 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.3 Other "work" unrelated to research (Avg. Score: 1.60)

NJ Specific Threats:

6.3.3.1 Construction projects may disrupt normal wildlife behavior which can result in reduced reproductive success or survival, abandonment of critical sites, etc. (e.g., bridge-nesting birds).

6.3.3.4 Workers may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

7 Natural Systems Modifications

7.1 Fire and Fire Suppression

7.1.1 Increase in Fire Frequency/Intensity (Avg. Score: 1.60)

NJ Specific Threats:

7.1.1.1 Increase in frequency and intensity of wild fires as a result of droughts and heat waves drying out vegetation and litter.

7.1.1.2 Increase in frequency of wild fires as a result of illegal activities.

7.1.1.3 Unnatural fire regimes occurring as a result of military exercises.

7.1.1.4 Lack of diversity in age structure and composition of vegetation due to expansive, frequent fires.

7.1.2 Suppression of Fire Frequency/Intensity (Avg. Score: 1.60)

NJ Specific Threats:

7.1.2.1 Shift in vegetative communities as a result of suppression of natural fires.

7.1.2.2 Lack of diversity in age structure and composition of vegetation due to the suppression of fire.

7.2 Dams and Water Management/Use

7.2.1 Abstraction of Surface Water (domestic use) (Avg. Score: 1.20)

NJ Specific Threats:

7.2.1.1 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.1.2 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.1.3 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, and eliminates shallow water habitats.

7.2.2 Abstraction of Surface Water (commercial use) (Avg. Score: 1.20)

NJ Specific Threats:

7.2.2.1 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, eliminates shallow water habitats, and disrupts/removes stream bottom habitat.

7.2.2.2 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.2.3 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.3 Abstraction of Surface Water (agricultural use) (Avg. Score: 2.00)

NJ Specific Threats:

7.2.3.1 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.3.2 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, and eliminates shallow water habitats.

7.2.3.3 Impounding water to create or expand bogs for cranberry farming leads to the loss of natural wetlands and the alteration of the natural hydrology in the area.

7.2.3.5 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.3.6 Abstraction of surface water may deplete upland mesic habitats of water needed by plants and wildlife.

7.2.5 Abstraction of Ground Water (domestic use) (Avg. Score: 3.00)

NJ Specific Threats:

7.2.5.1 Heavy withdrawal of ground water for domestic use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.5.2 Abstraction of ground water may deplete upland mesic habitats of water needed by plants and wildlife.

7.2.6 Abstraction of Ground Water (commercial use) (Avg. Score: 3.00)

NJ Specific Threats:

7.2.6.1 Heavy withdrawal of ground water for industrial and commercial use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.6.2 Abstraction of ground water may deplete upland mesic habitats of water needed by plants and wildlife.

7.2.7 Abstraction of Ground Water (agricultural use) (Avg. Score: 3.00)

NJ Specific Threats:

7.2.7.1 Heavy withdrawal of ground water for agricultural use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.7.2 Abstraction of ground water may deplete upland mesic habitats of water needed by plants and wildlife.

7.2.9 Small Dams (Avg. Score: 1.00)

NJ Specific Threats:

7.2.9.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.9.3 Dams act as a barrier to movement, limiting the ability of aquatic or semi-aquatic wildlife to move safely between habitats.

7.2.11 Dams (size unknown) (Avg. Score: 1.20)

NJ Specific Threats:

7.2.11.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.11.3 Dams act as a barrier to movement, limiting the ability of aquatic or semi-aquatic wildlife to move safely between habitats.

7.2.12 Culverts (Avg. Score: 1.60)

NJ Specific Threats:

7.2.12.1 Improper design, placement, installation and maintenance of culverts and other stream crossing structures can impede or prevent the movements of terrestrial organisms and can restrict or limit stream flow, impeding the movement of aquatic organisms along riparian corridors.

7.2.13 Stream Burial (Avg. Score: 1.40)

NJ Specific Threats:
- 7.2.13.1 Eliminates riparian habitats.
- 7.2.13.3 Alters the hydrology and quality of downstream aquatic and riparian habitats.

7.3 Other Ecosystem Modifications

7.3.2 Inappropriate timing of mowing (Avg. Score: 1.00)

NJ Specific Threats:
- 7.3.2.1 Increased risk of direct mortality and/or reduced productivity of wildlife, as well as reduced use by migrating species.

7.3.3 Removal of coarse woody debris (streams, forests, scrub-shrub habitats) (Avg. Score: 2.00)

NJ Specific Threats:
- 7.3.3.1 Decreases the available detritus that normally accumulates behind and within stream obstructions, minimizing or eliminating food sources and shelters for fishes, invertebrates and amphibians.
- 7.3.3.2 Decreases habitat and/or corridor suitability due to limited or absent shelter and foraging habitat.
- 7.3.3.3 Removal of dead trees (snags), large felled logs (i.e., those > 12" dbh), and other downed woody material diminishes nesting, roosting, and sheltering options for wildlife, and increases the ease at which deer can browse regenerating vegetation.
- 7.3.3.4 Decreases available basking, shelter, and foraging habitats.

7.3.4 Lack of natural disturbance patterns or ecosystem functions due to species loss (Avg. Score: 0.80)

NJ Specific Threats:
- 7.3.4.1 The management and/or loss of beavers decreases natural disturbance patterns.

7.3.5 Poor habitat management (Avg. Score: 1.00)

NJ Specific Threats:
- 7.3.5.1 Improper or poorly scheduled maintenance of man-made corridors (e.g., roadsides and medians) can cause direct mortality to and may reduce productivity of wildlife.
- 7.3.5.2 Shifting from natural vegetation to lawns can cause increased temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.
- 7.3.5.3 Vegetation clearing removes terrestrial and riparian corridors for animal movement, shelter, and resting areas.
- 7.3.5.4 Vegetation clearing or inappropriate alteration adjacent to aquatic habitats threatens aquatic species by degrading habitat and water quality (altering temperature and dissolved oxygen, increasing siltation and desiccation, etc.).
- 7.3.5.5 Habitat management that alters or removes vegetation without implementing long-term management increases the risk of invasive and exotic plants establishing themselves, outcompeting native vegetation.
- 7.3.5.6 Habitat management, including that which occurs on public and private lands, that does not consider timing and species' behaviors can result in the direct mortality and/or alteration or loss of habitat.
- 7.3.5.7 Improperly planned habitat management and/or mitigation efforts along roadsides and within the medians can attract wildlife and increase the risk of vehicle strikes.
- 7.3.5.10 Ditching, draining and filling of marshes and wetlands eliminates habitat and degrades the remaining surrounding areas for wildlife.
- 7.3.5.12 Lack of diversity in age structure and composition of vegetation due to lack of natural disturbances and/or vegetation management.
- 7.3.5.14 Intentional felling and removal of dead standing trees or snags eliminates resting, nesting or feeding habitat, and precludes the snags eventual contribution to coarse woody debris and forest floor structure and habitat.

7.3.5.17 Decreased diversity in height and species of herbaceous vegetation resulting in reduced cover and food for nesting and foraging wildlife.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species (Avg. Score: 2.00)

NJ Specific Threats:

8.1.1.1 Displace or outcompete native species for resources.

8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.

8.1.1.3 Invasive, non-native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

8.1.1.4 Invasive, non-native animals increase the risk of predation on native animals and/or herbivory on native vegetation.

8.1.1.5 Invasive, non-native animals and plants increase the risk of introduction and transference of diseases

8.1.1.6 Invasive, non-native plants may create physical barriers for some species.

8.1.2 Invasive non-native aquatic animals (Avg. Score: 1.40)

NJ Specific Threats:

8.1.2.1 Parasites introduced into the marine environment can alter the reproductive and feeding behavior of native wildlife, leading to their decline.

8.1.2.2 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminishing habitat suitability and reducing ecological integrity of natural communities, and may introduce disease into a population.

8.1.3 Invasive non-native aquatic plants (Avg. Score: 2.00)

NJ Specific Threats:

8.1.3.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.4 Invasive non-native terrestrial/wetland animals (Avg. Score: 1.00)

NJ Specific Threats:

8.1.4.1 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.4.2 Free-roaming and feral domestic animals such as cats and dogs causes direct mortality of wildlife and disturbance to wildlife breeding and resting areas.

8.1.5 Invasive non-native terrestrial/wetland plants (Avg. Score: 1.00)

NJ Specific Threats:

8.1.5.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.6 Invasive non-native fungal/bacterial diseases (Avg. Score: 2.00)

NJ Specific Threats:

8.1.6.1 The introduction of non-native fungal and bacterial diseases threatens native populations and ecosystems.

8.2 Problematic Native Species/Diseases

8.2.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats:

8.2.1.1 Overabundant native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

8.2.1.2 Invasive pathogens and insects may increase in range and abundance as limiting factors (such as temperature) are altered as a result of climate change.

8.2.1.3 Invasive, native species can out-compete non-invasive species for resources (food, light, shelter), leading to the demise of some species populations.

8.2.1.4 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.2.2 Named Species (Avg. Score: 1.00)

NJ Specific Threats: 8.2.2.2 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.4 Problematic Species/Diseases of Unknown Origin

8.4.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.4.1.1 Non-native or poorly understood diseases and parasites could potentially impact native animals.

8.4.2 Named Species (Avg. Score: 0.60)

NJ Specific Threats: 8.4.2.2 Diseases of unknown origin, such as snake fungal disease and Ranavirus, can cause significant mortality among native animal populations.

8.5 Viral/Prion-induced Diseases

8.5.1 Unspecified Species (Disease) (Avg. Score: 1.00)

NJ Specific Threats: 8.5.1.1 There is a large knowledge gap regarding the existence of, or potential for, other diseases impacting native wildlife.

8.5.2 Named Species (Disease) (Avg. Score: 2.00)

NJ Specific Threats: 8.5.2.1 Diseases such as West Nile Virus, arenavirus, sudden oak death, Avian Influenza, and snake fungal disease cause morbidity or mortality to native populations.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.1 Domestic and Urban Waste Water

9.1.1 Sewage (Avg. Score: 1.40)

NJ Specific Threats: 9.1.1.1 Degradation of aquatic and marine water quality and habitats by changing turbidity, flow and water chemistry.

9.1.1.2 Leads to increased eutrophication and algae blooms that result in oxygen depletion.

9.1.1.3 Contaminants in sewage treatment effluents and Combined Sewer Overflows can cause developmental and behavioral abnormalities and reproductive failure in wildlife.

9.1.2 Run-off (Avg. Score: 2.00)

NJ Specific Threats: 9.1.2.1 Chemical fertilizers and nutrient run-off changes the pH in streams and ponds and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.1.2.2 Contaminants degrade aquatic and marine water quality and can bioaccumulate in benthic organisms, threatening wildlife by causing developmental and behavioral abnormalities and reproductive failure.

9.1.2.3 Contaminants from road runoff (oil, sediment, salt, etc.) impact native vegetation and the species that rely upon them, degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2 Industrial and Military Effluents

9.2.1 Oil Spills (Avg. Score: 0.80)

NJ Specific Threats:

9.2.1.1 Oil spills render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.1.2 Oil spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.1.3 Oil spills cause external oiling of wildlife and ingestion of oil, both of which can injure or kill wildlife.

9.2.2 Seepage from Mining (Avg. Score: 1.00)

NJ Specific Threats:

9.2.2.1 Contaminants from mining degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2.3 Other (Avg. Score: 2.00)

NJ Specific Threats:

9.2.3.1 Point and nonpoint source pollution such as polychlorinated biphenyls (PCBs), pesticides, heavy metals, and endocrine disrupting compounds (EDC's) into freshwater and marine systems pose threats to wildlife through direct contact and/or ingestion, and to aquatic species and their predators through bioaccumulation, impacting the reproductive success and neurological function of many avian and fish species.

9.2.3.2 Chemical spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.3.3 Chemical spills may render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.5 Other: Industrial toxic settling ponds (Avg. Score: 1.00)

NJ Specific Threats:

9.2.5.1 Surficial or open industrial effluent ponds can cause injury or death to wildlife that become exposed through ingestion or submersion.

9.3 Agricultural and Forestry Effluents

9.3.1 Nutrient Loads (Avg. Score: 2.00)

NJ Specific Threats:

9.3.1.1 Chemical fertilizers and nutrient run-off changes the pH in streams, ponds and wetlands and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.3.1.2 Animal waste degrades terrestrial and aquatic habitats, especially streams, ponds and wetlands, resulting in eutrophication, which disrupts oxygen and nutrient balances, and causes injury and mortality to aquatic organisms.

9.3.1.4 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades wetland and aquatic habitats with runoff, increasing sediment and nutrient loads and pH.

9.3.1.5 Conversion of native forests to plantations degrades wetland and aquatic habitats through increased runoff.

9.3.2 Soil Erosion and Sedimentation (Avg. Score: 1.60)

NJ Specific Threats:

9.3.2.1 Soil erosion, sedimentation and destruction of streambanks and riparian buffers degrade waters making them unsuitable for riparian-dependent wildlife.

9.3.2.3 Conversion of native forests to plantations degrades wetland and aquatic habitats through increased sedimentation.

9.3.3 Herbicides and Pesticides (Avg. Score: 2.00)

NJ Specific Threats: 9.3.3.1 Pesticides degrade terrestrial and aquatic habitats, especially streams, ponds and wetlands. Aquatic wildlife are particularly sensitive to these contaminants, which can cause developmental and behavioral abnormalities and reproductive failure. Some contaminants may bioaccumulate in predatory fish and birds and disrupt reproduction.

9.3.3.3 Use of pesticides can directly harm non-target species through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture (Avg. Score: 2.00)

NJ Specific Threats: 9.3.5.1 Use of pesticides, insecticides, and/or herbicides can directly harm non-target species, such as amphibians and beneficial invertebrates through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5.4 Improper use of current insecticides, such as those containing esfenvalerate, prallethrin, or piperonyl butoxide, or past use of pesticides containing chlordane still present in the soils, are toxic to various wildlife species, and can cause injury, mortality, or other effects that impair population viability.

9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.4 Garbage and Solid Waste

9.4.1 Direct hazards to wildlife (Avg. Score: 1.00)

NJ Specific Threats: 9.4.1.2 Garbage and solid waste destroys natural habitats and obstructs wildlife movements.

9.5 Air-Bourne Pollutants

9.5.1 Acid Rain (Avg. Score: 1.60)

NJ Specific Threats: 9.5.1.1 Causes acidification of water bodies, resulting in changes to aquatic and marine communities and reducing biodiversity, and creating conditions that are unsuitable for some aquatic (freshwater and marine) and semi-aquatic species that are sensitive to pH shifts.

9.5.1.2 Leaches calcium from the soils which in turn reduces the availability of prey, particularly calcium-rich prey such as snails.

9.5.4 Other (Avg. Score: 1.00)

NJ Specific Threats: 9.5.4.1 Dust and/or airborne sedimentation from construction sites, agricultural operations or related earth disturbances can introduce mineral or organic sediments into adjacent wildlife habitats, degrading their quality and suitability for wildlife short-term and/or long-term.

9.5.6 Herbicides and Pesticides (Avg. Score: 2.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

9.6 Excess Energy

9.6.1 Light Pollution (Avg. Score: 0.80)

NJ Specific Threats: 9.6.1.1 Artificial lighting can reduce suitability of adjacent habitat for species sensitive to artificial lights by disorienting wildlife, reducing foraging suitability or success, or increasing visibility to predators, resulting in reduced diversity and/or productivity of species in adjacent habitat.

9.6.2 Thermal Pollution (Avg. Score: 1.00)

NJ Specific Threats: 9.6.2.2 Water temperature changes to aquatic systems can deter or preclude use by SGCN (e.g., alter habitat suitability for wildlife species, reduce prey base) or present stressors that are harmful if not fatal to wildlife.

9.6.3 Noise Pollution (Avg. Score: 0.80)

NJ Specific Threats: 9.6.3.1 Acute and chronic noise pollution in and adjacent to terrestrial and aquatic (marine and freshwater) environments could disrupt normal behaviors of wildlife such as migration, communication, feeding, eluding predators, resting and breeding, etc.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 1.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.2 Droughts

11.2.1 Droughts (Avg. Score: 2.00)

NJ Specific Threats: 11.2.1.1 Contribute to hardened soils, decreasing water recharge during rains and increasing the likelihood of flash floods during storms.

11.2.1.2 Lead to lower groundwater levels and therefore, less available water for people and habitats.

11.2.1.3 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

11.2.1.6 Increased desiccation risk for amphibians and altered wetland hydrology for critical habitats including breeding pools.

11.3 Temperature Extremes

11.3.1 Temperature extremes (Avg. Score: 2.00)

NJ Specific Threats: 11.3.1.1 Increasing temperatures may cause habitat loss and degradation by desiccating and/or raising the temperatures of small wetlands and streams leading to the loss of freshwater mussels and other aquatic species and species reliant upon these habitats.

11.3.1.2 Increased temperatures can negatively impact wetland, riverine, lacustrine and vernal pool-associated or -dependent wildlife by reducing flows, increasing water temperatures, lowering water levels and causing premature drying of vernal habitats.

11.4 Storms and Flooding

11.4.1 Storms and flooding (Avg. Score: 1.00)

NJ Specific Threats: 11.4.1.1 Extreme storms and flooding events threaten aquatic and marine wildlife through habitat degradation and alteration, including alterations to off-shore or back-bay benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic and marine wildlife.

11.4.1.3 Increase risk of saltwater intrusion to freshwater habitats altering the water chemistry and potentially altering aquatic wildlife community.

11.4.2 Increased rainfall (Avg. Score: 1.00)

NJ Specific Threats: 11.4.2.1 Extreme rain events threaten aquatic wildlife through habitat degradation and alteration, including alterations to benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic wildlife.

11.4.2.2 Extreme rain events can damage wildlife nesting and resting habitats, including impacts to avian eggs and chick and small mammal survivorship.

11.4.2.3 More frequent rain events can alter terrestrial and wetland vegetation communities as well as wetland hydrology, shifting wildlife community use.

11.6 Phenology Shifting or Alteration

11.6.2 Phenology shifts related to predator-prey ecology (Avg. Score: 1.00)

NJ Specific Threats: 11.6.2.1 Alters inter-specific relationships (e.g., competition, parasitism, predation) of wildlife, ultimately leads to detrimental impacts on the ecological system.

11.6.2.2 Shifts timing of species migration, breeding and hibernation, and available food resources, causes redistribution of species, or mortality for species that are unable to relocate due to their already isolated habitat or limited mobility.

11.6.3 Phenology shifts related to species redistribution (Avg. Score: 1.00)

NJ Specific Threats: 11.6.3.1 Shifts in timing of species migration, breeding and hibernation, and available food resources, as a result of wildlife range shifts driven by climate change.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 1.00)

NJ Specific Threats: 12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.2 Lack of up-to-date existing information (Avg. Score: 1.00)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.3 Need to answer research question (Avg. Score: 1.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.4 Need to develop new technique (Avg. Score: 1.00)

NJ Specific Threats: 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 1.40)

NJ Specific Threats: 12.3.0.1 Regulatory habitat protections within state land use regulations are spatially limited to specific geographic areas (e.g., Pinelands, Coastal Area) or geographic features (e.g., wetlands, streams) and so fail to protect critical habitats that exist outside of these regulated areas.

12.3.0.6 Certain geographic or habitat features, such as vernal pools and headwater wetlands or streams, may be too small, mischaracterized, or misidentified to benefit from regulatory protection.

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.9 Prescribed burns implemented by the NJ Forest Fire Service are constrained by State air quality regulations to a timeframe where seasonal weather conditions are less than ideal for effective burning. As a result, the Forest Fire Service is limited in the number of overall prescribed burns it can implement to restore habitat for wildlife.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 1.00)

NJ Specific Threats: 12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.

12.4.0.3 Lack of internal understanding regarding beneficial habitat impacts of storm events leads to policies and practices that reverse or decrease such beneficial effects (e.g., beach-filling, shoreline hardening, "hazard" tree and log removal from forests, etc.

12.4.0.5 Bureau of Forest Fire Management policy has traditionally implemented prescribed burns on State lands for the sole purpose of public safety (i.e., addressing hazard fuel reduction), missing opportunities to burn in a manner that would additionally manage habitat for ecological diversity.

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 2.00)

NJ Specific Threats: 14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 2.00)

NJ Specific Threats: 14.2.1.1 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various forest management practices.

14.2.1.2 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various aquatic and riparian management practices.

14.2.1.5 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various wetland management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 1.60)

NJ Specific Threats: 15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.4 Secure and promote the protection, restoration, and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts through incentive programs.

1.2.1.5 Secure and promote the protection/restoration of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through incentive programs.

1.2.1.6 Secure and promote the protection/restoration of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers through incentive programs.

1.2.1.7 Secure and promote the protection/restoration of fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.9 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing Forestry Stewardship Programs.

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.12 Create incentives (non-monetary and/or monetary) for land developers to redevelop abandoned areas (e.g., shopping centers, office complexes) to minimize the loss of natural habitats and reduce the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.14 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of herbicides and pesticides, and implementing more ecologically safe strategies when using such products.

1.2.1.15 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of rodenticides, and implementing more ecologically safe strategies when using such products.

1.2.1.18 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and land managers to control and reduce the impacts of invasive, native and non-native species in order to increase structural habitat diversity.

1.2.1.19 Create incentives for federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to farmers, woodland landowners, and private landowners to adopt and/or endorse consistent BMPs concerning controlled burns to maintain and/or improve wildlife habitat.

1.2.1.20 Coordinate across government agencies and non-government organizations to create or expand upon tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMP's.

1.2.1.22 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to horse/livestock farm owners and managers to increase structural habitat diversity in and around the farms by managing vegetation for a variety of species, in particular, farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

1.2.1.28 Create incentives to implement dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

2 Direct Management of Natural Resources

2.2 Dam and barrier removal

2.2.1 Culvert work

2.2.1.1 Replace existing barriers to wildlife movement with and/or install appropriately-sized systems to accommodate wildlife dispersal.

2.3 Fire management

2.3.2 Fuel reduction

2.3.2.1 Prevent wildfires by reducing natural fuel (e.g., leaf litter).

2.3.3 Prescribed burning

2.3.3.1 Evaluate different management techniques of prescribed burns that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

2.3.3.2 Conduct prescribed burning in Northern New Jersey forests to maintain and regenerate a mosaic of upland forest habitats.

2.3.3.3 Conduct prescribed burning to improve wildlife habitat.

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.2 Develop, implement, monitor and evaluate pest control/management strategies to reduce the impacts of over-abundant wildlife species (native and/or native, invasive species) on native vegetation and the degradation of habitats supporting SGCN. Over-abundant wildlife species include but are not limited to mute swans, Canada geese, beaver and white-tailed deer.

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.5 Implement biologically safe and appropriate control/management strategies, and where appropriate, eradication strategies to reduce the impacts and/or limit the distribution of invasive and/or non-native plant species within or near aquatic systems using methods that will provide the most protection to the aquatic and riparian ecological system, and minimize disturbance to the soil and wildlife. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.8.0.6 Implement long-term management of invasive and/or non-native plants to help maintain functioning ecological systems and biological diversity, and to enhance travel corridors. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.4 Restore and/or enhance suitable travel corridors connecting conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.8 Protect significant natural and/or unique communities by implementing best management practices when conducting habitat restoration strategies.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.15 Restore and/or enhance terrestrial and aquatic habitats proximate to but not adjacent to roads and other transportation corridors for terrestrial-bound SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.10.0.19 Provide woody debris within documented Tiger Salamander pools to benefit Tiger Salamanders and other associated vernal pool herpetofauna for shelter, egg-attachment and soil protection.

2.10.0.20 Expand breeding opportunities for obligate vernal pool breeders and related herpetofauna by creating vegetated buffers for dispersal from breeding pools in all directions, or as needed to establish the connectivity of metapopulations.

2.10.0.21 Restore and/or enhance understory habitats that suppress invasive species and provide critical resources and enhance sheltering, foraging, and nesting cover for wildlife.

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.10.0.24 Use NJ's CHANJ mapping and guidance to establish vegetation and enhance or create corridors between fragmented habitats with similar vegetation, slope, soils, structure, etc. to ensure vegetative integrity is maintained to allow wildlife to safely disperse, and corridors are buffered with natural habitats to minimize disturbance to wildlife within the corridors.

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.11.0.3 Create suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats through vegetation management.

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through vegetation management.

2.11.0.6 Reclaim degraded rare species habitats by conducting vegetation management needed to restore habitat value for the documented/target SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.8 Maintain, enhance and/or restore biologically appropriate buffers for SGCN-inhabited/used freshwater wetlands through vegetation management.

2.11.0.13 Implement best management practices (BMPs), protective strategies, and guidelines for vegetation management to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.11.0.14 Conduct vegetation management adjacent to roads for SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.11.0.16 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.11.0.19 Implement forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN.

2.11.0.21 Minimize the degradation, alteration and/or changes in hydrology of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and subsequent disturbances to and behavioral changes of wildlife by maintaining or enhancing these areas and biologically appropriate buffers through habitat management and/or revegetation or restoration efforts.

2.11.0.23 Implement appropriate habitat management actions in areas where natural disturbances, such as wildfire, have been precluded.

2.11.0.24 Conduct vegetation management adjacent to aquatic habitats following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.26 Conduct vegetation management along roadsides and medians, avoiding peak activity periods for wildlife, that enhances wildlife dispersal naturally and safely across roads and similar barriers to/between terrestrial and/or aquatic habitats.

2.11.0.31 In areas where vegetative communities are shifting due to fire suppression and controlled burns are not feasible, manage vegetation to improve wildlife habitat.

2.11.0.32 Increase structural habitat diversity around and when feasible, within agricultural landscapes by managing vegetation for a variety of species, in particular, those farms that have removed scrub-shrub habitat and/or fragmented forests, and by implementing ecologically best practices (e.g., no-till farming, maintaining hedgerows, buffer set-asides, etc.).

2.11.0.33 Increase structural habitat diversity by implementing long-term vegetation management to minimize the potential for the establishment of invasive and/or non-native plants that may outcompete native vegetation.

2.11.0.35 Increase structural habitat diversity by managing vegetation adjacent to aquatic habitats in a manner that provides a buffer from runoff and erosion and a microclimate to stabilize seasonal temperatures to benefit a variety of aquatic and semi-aquatic species.

2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.

2.11.0.37 Increase structural habitat diversity by minimizing the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats which benefits wildlife.

2.11.0.38 Increase structural habitat diversity in and around horse/livestock farms by managing vegetation for a variety of species, in particular, in and around farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

2.11.0.41 Increase structural habitat diversity through the implementation of a variety of vegetation management practices such a prescribed burns (either increasing or decreasing their frequency depending on the site and objective), plantings, etc. that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.43 Manage forests to increase variation in age structure and composition using BMPs that promote and maintain functioning ecological forest-based systems and biological diversity.

2.12 Water management

2.12.1 Ditch plugs

2.12.1.1 Implement best management practices (BMPs), protective strategies, and guidelines for ditch plugging to maintain and enhance healthy, resident and migratory SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.12.3 Drainage

2.12.3.3 Remove tile drains and drainage ditches to improve wetland hydrology and restore natural stream flows during appropriate times to avoid sensitive periods (e.g., nesting, denning, roosting) and minimizes harm to wildlife, particularly SGCN.

2.12.3.4 Expand the acreages and enhance the effective size of SGCN habitats by reclaiming/restoring adjacent, degraded habitats by removing tile drains and drainage ditches.

2.12.3.5 Remove drainage ditches adjacent to roads to decrease the attraction for amphibians, reptiles and small mammals, and thereby minimizing road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.12.3.6 Protect significant natural and/or unique communities by and when removing tile drains and drainage ditches.

2.12.3.11 Implement best management practices (BMPs), protective strategies, and guidelines when removing tile drains and drainage ditches to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.12.7 Waterfowl impoundment maintenance

2.12.7.14 Prevent or ameliorate near-term impacts of climate change throughout the State but in particular within the coastal and Delaware Bay areas by implementing habitat management strategies that will establish/improve habitat resilience, such as impoundment management, that benefits wildlife inhabiting these areas.

2.13 Wildlife damage management

2.13.0 Nuisance fish and wildlife damage

2.13.0.1 Investigate the impacts of mosquito control methods on predator SGCN (bats, insectivorous birds). Develop, implement and evaluate the effectiveness of mosquito control-BMPs designed to avoid depletion or contamination of SGCN's insect prey base and drinking sources with pyrethroids, organophosphates, or other chemicals.

2.13.0.4 Investigate the effects of mosquito control methods on freshwater aquatic and semi-aquatic SGCN including but not limited to, amphibian, fish, dragonfly, and damselfly populations.

2.13.0.7 Develop, implement, monitor and evaluate management strategies to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

2.13.0.8 Implement and assess management strategies to control and reduce the impacts of detrimental species and diseases that pose threats to native wildlife or communities.

2.14 Wildlife disease management

2.14.0 Wildlife disease strategy development and investigation

2.14.0.1 Investigate diseases/pathogens impacting SGCN and/or their habitats.

2.14.0.2 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

2.14.0.3 Protect SGCN from exotic pathogen introduction or incident through implementation of a "rapid response plan"; DFW to give priority attention to these species in planning and/or implementing a response.

2.14.0.4 Conduct long-term monitoring of diseases in vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts.

2.14.0.5 Assess the impacts of diseases on the life cycles of wildlife.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.6 Conduct long-term studies on resident and migratory SGCN to determine if there are changes to the populations' demography (productivity, survival, dispersal) and/or to their critical and/or supporting habitats (i.e., diminishing in value, acreage or connectivity, etc.), in particular changes that would not maintain SGCN at viable levels for species populations. Update data and GIS maps; provide updated information to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.9 Identify SGCN (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources, and compile/collect and evaluate data/information regarding potential management strategies to improve the availability of such SGCN's food resources.

3.0.0.11 Develop, implement and evaluate the effectiveness of town plans that avoid impacts to SGCN species and their habitats.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.14 Identify areas with invasive, aquatic plants and animals and collect a detailed baseline assessment of the species' status and distribution. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort. Researchers and contractors performing Forest Stewardship Inventories and/or Plans on state lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.0.0.15 Conduct long-term monitoring of areas identified as having invasive, aquatic plants and animals to track the species' status/progress over time with or without the implementation of management strategies. Areas without management strategies should be assessed and prioritized for management/control. Areas where management strategies are being implemented should include an assessment of the management effort and identify/recommend and implement necessary changes to improve its success. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort.

3.0.0.19 Identify the presence and status (e.g., functioning, structure, slated for removal, etc.) of existing dams and culverts within and/or that may impact SGCN and their habitats, and create a database that includes a GIS component identifying the locations of such structures and their status. Share this information with appropriate organizations and/or agencies evaluating the benefits and risks of such structures on SGCN and their habitats.

3.0.0.20 Once baseline data identifying and describing the status of existing dams and culverts have been gathered, conduct evaluations at a variety of sites to determine whether the benefits of culvert and dam creation or removal outweigh the risks to SGCN species and their habitats, and if other variables/conditions specific to individual sites/locations result in a different outcome. Identify and target appropriate dams and culverts for removal and/or reconstruction to minimize harm to SGCN species and their habitats.

3.0.0.23 Identify (through wildlife and aquatic system surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and research water quality parameters for all [types of] aquatic systems for various SGCN populations.

3.0.0.24 Identify (through aerial and topographic maps), and confirm through field surveys, potential vernal pools using standard protocols. Provide confirmed vernal pool locations (and when possible, a description of the pools condition) and species' presence data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.26 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species including objectives and guidance pertaining to and the condition/status of critical and supporting habitats.

3.0.0.27 Evaluate the effectiveness of strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals through research and monitoring. Develop and provide NJ DEP and other appropriate governing agencies/commissions a summary of findings and recommendations to improve such efforts.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.2 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.0.3 Survey for and monitor populations of freshwater aquatic focal SGCN to assess the populations' demography, trends, condition, distribution, etc.

3.2.0.4 Conduct long-term monitoring of the impacts of contaminants to vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.2.0.5 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

3.2.0.6 Develop, implement and conduct studies to evaluate the effectiveness of methods implemented to reduce road mortality of wildlife (e.g. wildlife underpasses, road closures).

3.2.0.7 Track (via a database that includes a GIS component) and research problematic species and diseases to determine their distribution, impacts on SGCN wildlife/wildlife communities, and develop potential control measures.

3.2.0.8 Implement and conduct long-term monitoring of control measures aimed at minimizing the impacts of problematic species and/or diseases to evaluate the effectiveness of such efforts and to identify and incorporate additional strategies as appropriate.

3.2.0.10 Evaluate the effectiveness of sanitation/decontamination protocols in minimizing the transference of wildlife diseases and invasive plant species.

3.2.0.11 Investigate the impacts of ORV use as a mechanism to spread wildlife diseases and invasive plant species to native wildlife and habitats. Integrate this information when mapping undeveloped roads and trails to identify potentially sensitive areas in northern NJ forests.

3.2.0.12 Investigate the impacts of ORV use and ORV-created noise on terrestrial and aquatic wildlife behavior and the impact of direct mortality from vehicle strikes. Integrate this information when mapping undeveloped roads and trails to identify potentially sensitive areas in northern NJ forests.

3.2.0.21 Investigate the effects of mosquito control methods on freshwater aquatic and semi-aquatic SGCN including but not limited to, amphibian, fish, dragonfly, and damselfly populations.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.2 Age, size and sex structure

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.3 Baseline inventory

3.2.3.7 Identify roads or portions of roads, paved or unimproved (through site surveys, land use/land cover assessments and analyses, review of available data, enlistment of species experts, etc.) with high incidences of road mortality and/or presence of snakes, turtles, medium-sized and large mammals. Conduct assessments of the roads and incorporate information into a database that includes descriptions (e.g., qualifiers to help prioritize the roads' risk to wildlife) and a GIS component of the locations of such areas. Share this information with appropriate organizations and/or agencies working to implement measures (e.g., wildlife passages, road closures) to minimize the risk to these species.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.6 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) that could, through revegetation and/or enhancement efforts, become suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN.

3.3.1.7 Map and prioritize existing and potential areas for early succession forest management. Share the results with state, county and municipal planners.

3.3.1.8 Assess the availability and suitability of forest habitats for SGCN species (particularly reptiles and amphibians, birds, pollinators, and tiger beetles) in southern forests since Superstorm Sandy.

3.3.1.10 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and document fish SGCN habitats by plotting their distributions in GIS and submitting the data to the State for integration into the DEP's Biotics database.

3.3.1.12 Conduct an initial assessment of and document the availability and suitability of intact, preserved forest blocks containing vernal pools within the possible range of Eastern Tiger Salamander, which appear under-represented on a landscape scale. Incorporate findings into a database that includes descriptions and qualifiers of the habitats, and a GIS component of the locations of such areas. Share this information with appropriate organizations and/or agencies working to implement habitat restoration and enhancement strategies to provide opportunities for this salamander to disperse and expand its current range.

3.3.1.13 Conduct wildlife surveys to confirm or reconfirm locations with suitable hydrologic conditions for tiger salamanders and associated vernal pool herpetofauna.

3.3.1.16 Gather "best information" for spatial modeling and update/create a current model/depiction of anticipated habitat shifts from sea-level rise, flooding, etc.

3.3.1.17 Identify and map undeveloped roads and trails in all conserved forests, and create a database of locations. Integrate information regarding potentially sensitive areas.

3.3.1.18 Conduct an assessment using available data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels.

3.3.1.19 Identify and codify legal ORV access areas on state (and if appropriate, other conserved) lands. Provide GIS mapping to the landowner for potential use in directing such recreational activities.

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.2 Monitoring

3.3.2.1 Evaluate the effectiveness of forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.4 Protect water quality and aquatic-dependent species by appropriately designating Category 1 waters and enforcing protective regulations. Seek appropriate classifications for stream segments based on Endangered and Threatened Status and/or the Index of Biotic Integrity (IBI) results that do not fulfill Category One requirements.

3.3.2.5 Conduct long-term monitoring of water quality of SGCN aquatic habitats (and aquatic systems feeding into those habitats) to evaluate protection and management efforts to reduce, if not eliminate, chemical contamination, siltation, eutrophication, and other forms of pollution/contamination of aquatic systems.

3.3.2.8 Evaluate the effectiveness of current prescribed burning practices on Pinelands dependent species.

3.3.2.9 Investigate the effectiveness of various silviculture techniques for enhancing forests for forest-dependent SGCN.

3.3.2.10 Evaluate the efficacy and success of different management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.3.2.14 Research and evaluate the effectiveness of water quality management practices on water-dependent and semi-dependent SGCN, particularly those practices associated with permitting or mitigation actions.

3.3.2.15 Investigate the effectiveness of management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.3.2.17 Conduct long-term habitat monitoring to determine the continued availability and suitability of intact, preserved forest blocks containing vernal pools within the possible range of Eastern Tiger Salamander. Update the database (to be developed during baseline assessments) regarding the forests' and vernal pools' conditions. Share this information with appropriate organizations and/or agencies working to implement habitat restoration and enhancement strategies to provide opportunities for this salamander to disperse and expand its current range.

3.3.2.18 Conduct long-term monitoring of and wildlife surveys at locations with suitable hydrologic conditions for Eastern Tiger Salamanders and associated vernal pool herpetofauna.

3.3.2.20 Once a system is developed for reporting and qualifying new locations of invasive species, develop, implement and monitor/evaluate invasive species removal strategies at identified locations. Priority should be given to those areas critical to SGCN and/or contain unique and/or rare plant communities supporting SGCN and/or other fish/wildlife species.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.3 Develop/improve management techniques that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.7 Develop/improve forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

3.5.3.8 Develop best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5.3.9 Develop strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.14 Develop aquaculture practices in the coastal areas that are compatible with the recovery of SGCN.

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.3.16 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.3.19 Work with foresters to develop prescribed burning practices for Pinelands dependent species that increase or maintain habitat quality for these species in the Pinelands.

3.5.3.20 Develop guidance on various silviculture techniques for enhancing forests for forest-dependent SGCN.

3.5.3.21 Develop management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.22 Identify (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) and modify management strategies (e.g., timing restrictions for mowing, cooperative agreements with utility companies for maintenance of rights-of-ways), based on research, that maintain and enhance large existing areas of grassland in perpetuity.

3.5.3.23 Revise water quality management practices based on research on water-dependent and semi-dependent SGCN, particularly when associated with permitting or mitigation actions.

3.5.3.24 Based on research, modify management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.4 Investigate the effects of mosquito control methods on freshwater aquatic and semi-aquatic SGCN including but not limited to, amphibian, fish, dragonfly, and damselfly populations.

3.5.4.5 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

3.5.4.6 Investigate the feasibility of mitigating for the impacts of contaminants to vulnerable wildlife, particularly SGCN. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.5.4.9 Conduct studies to evaluate the impacts of roads on SGCN and develop, implement and conduct studies to evaluate the effectiveness of methods to reduce road mortality of wildlife (e.g. wildlife underpasses, road closures).

3.5.4.13 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.4.14 Develop and implement agreements, and update existing agreements, with government agencies regarding the protection of critical SGCN habitats (e.g., significant breeding populations of beach nesting birds, colonial waterbird nesting areas, bat colonies, etc.).

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.17 Investigate new, non-invasive techniques for SGCN population evaluation through literature review, expert opinion, trial studies (if low risk), etc.

3.5.4.18 Investigate the effectiveness of survey techniques through selected “ground truthing” and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

3.5.4.21 Develop BMPs to address problematic species and diseases of unknown origin.

3.5.4.22 Investigate the efficacy of implementing strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities.

4 Education

4.1 Educator/Instructor training

4.1.0 Public education

4.1.0.1 Provide educational resources and training programs to private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

4.1.1 Aquatic resource education

4.1.1.1 Provide educational resources and training programs to teachers in aquatic resource education that includes information regarding climate change and sea-level rise for incorporation into the class curriculum and/or as the focus of school field trips.

5 Facilities and Areas

5.15 Wildlife Management Areas

5.15.6 Roads

5.15.6.1 Clearly post areas/roads where vehicle access is permitted.

5.15.6.2 Clearly post areas/trails where vehicle access is not permitted.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.1 Enhance and increase the effective size of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates by securing adjacent habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.3 Secure and protect riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.4 Secure and protect fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.7 Secure and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.1 Land acquisition

6.1.1 Fee title

6.1.1.1 Use state, federal, and local land acquisition programs (e.g., Green Acres, Blue Acres, etc.) to acquire abandoned or failing bay shore communities and to relocate displaced people and infrastructure.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.3 Increase the protection of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through conservation area designations.

6.3.0.4 Promote the protection of fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through conservation area designations.

6.3.0.7 Promote the protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through conservation area designations.

6.4 Private lands agreements

6.4.0 Private land agreement strategies

6.4.0.1 Enter into private lands agreements to expand control burns on private lands, in particular those adjacent to conserved lands to improve SGCN habitats.

7 Law Enforcement

7.1 Law enforcement

7.1.3 Sub-national Level

7.1.3.2 Increase the number of law enforcement officers tending to wildlife issues to a reasonable number to sufficiently cover the State and marine waters.

7.1.4 Scale Unspecified

7.1.4.1 Improve enforcement of policies and/or regulations that promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

7.1.4.3 Increase law enforcement presence proximate to sensitive areas [e.g., avian nesting sites, in particular rookeries, and reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively)] to deter human activity and subsequent disturbance to SGCN.

7.1.4.6 Recruit law enforcement to assist in the protection and enhancement of SGCN populations, in particular endangered species, through improved awareness of species through trainings, partnerships, and other methods. Information should include but is not limited to: 1) Issues concerning illegal collection of reptiles, 2) Persecution of rare snakes, 3) Illegal recreational activities on public lands (e.g., off-road vehicles) and their impact on wildlife, 4) Identification of sensitive areas, critical sites and/or "hot-spots" for collection.

7.1.4.7 Increase law enforcement presence to enforce regulations governing recreational activities (e.g., the use of personal watercraft and off road vehicles, caving, rock climbing, etc.) on conserved lands and within other sensitive habitats, and discourage activities that cause harm or disturbance to vegetation, wetlands, fish and wildlife.

7.1.4.9 Implement policies that improve and secure habitat connections between conserved SGCN habitats.

7.1.4.10 Implement policies that promotes expanding acreages and enhances the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.13 Implement policies that protect vernal pool habitats to benefit SGCN that rely upon them and promotes connectivity of SGCN populations.

7.1.4.15 Implement policies that preserve and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

7.1.4.16 Implement policies that protect and restore riparian areas.

7.1.4.17 Improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

7.1.4.23 Implement policies that minimize wildlife road mortality.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.2 Develop a team of personnel from government entities, conservation organizations and other stakeholders engaged in oil/gas spill response for marine and freshwater habitats to develop a feasible plan for oil spill response and/or to amend NJ's current oil spill response plan that clearly outlines each organizations responsibilities and an assessment and location list of available equipment for boom deployment during oil spills.

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.1.0.4 Engage government agencies, conservation partners and other stakeholders in constructive dialogues encouraging them to influence policy change and the creation of incentives through a habitat bill and/or municipal ordinances for backyard habitat.

8.1.0.13 Engage DOD in a constructive dialogue regarding strategies to minimize disturbances to all SGCN (i.e., beyond their federal requirements) from forest management and other practices on their lands.

8.1.0.14 Engage DOD in a constructive dialogue regarding strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities.

8.1.0.15 Engage government agencies, conservation partners and other stakeholders in discussions encouraging and supporting the creation of laws and policies requiring vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

8.1.0.16 Engage local governments in discussions regarding the importance of them adopting/passing ordinances which require assessing and addressing secondary impacts (i.e., ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

8.1.0.17 Engage municipalities in constructive dialogue to identify and minimize destruction of areas prioritized for early succession forest management.

8.1.0.18 Engage NJDOT, NJ Transit Authority and other road management entities, wildlife conservation organizations/agencies (e.g., Division of Fish and Wildlife, New Jersey Conservation Foundation, Conserve Wildlife Foundation of NJ), and communities and citizens in discussions regarding the importance of and methods to enhance habitat connectivity, and work together to develop feasible strategies for ensuring that wildlife can disperse naturally and safely across roads and similar barriers to terrestrial and/or aquatic habitats.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.21 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation human-subsidized and/or overabundant, native species cause to local nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.22 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation invasive species cause to native nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.26 Coordinate across federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to woodland landowners to adopt or endorse consistent best management practices concerning controlled burns to maintain and/or improve forested habitat for wildlife.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.33 Engage government agencies, conservation partners and other land managers, communities, landowners, and commercial and industrial stakeholders in discussions regarding the importance of protecting and methods to protect priority wetlands beyond the levels afforded through regulation by maintaining and/or restoring optimal biological buffers around wetlands.

8.1.0.34 Work with the NJ Education Association and Department of Education to design curriculum and outdoor experimental learning opportunities, and provide training to teachers on implementation of these activities.

8.1.0.37 Enlist landowners and NJ citizens in the protection of and survey efforts for SGCN, in particular rare species, by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management and wildlife-related volunteer programs.

8.1.0.38 Engage partners, stakeholders and land managers in constructive dialogue promoting forest stewardship for SGCN that use core forests and forested corridors.

8.1.0.40 Encourage researchers, land managers, naturalists and enthusiasts to follow proper procedures for the coordination and/or permitting of research/management activities involving wildlife and sensitive habitats, and discourage activities that alter vegetation or wetlands, or cause harm or disturbance to wildlife.

8.1.0.42 Engage citizens, wildlife observers and photographers through discussions and distributable information regarding the importance of and encouraging implementing responsible and ethical behavior when observing wildlife by developing an alliance of wildlife photographers and widely circulating recommendations on how to reduce impact.

8.1.0.44 Engage conservation partners, stakeholders, government agencies and other land stewards in constructive dialogues encouraging their inclusion of controlled burns in forest and other stewardship plans.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.2 Recruitment and retention activities

8.2.3 For wildlife watching

8.2.3.1 Develop and implement nature-focused tourism opportunities including wildlife viewing sites, interpretive signage highlighting unique ecosystems/habitats, and wildlife-related recreational opportunities that do not negatively impact SGCN or their habitats.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.7 Develop and provide (or otherwise make publicly available) educational programs and/or materials that describe the negative impacts of off-road vehicles and watercraft use in and adjacent to critical SGCN habitats, and the importance of confining such activities to more appropriate locations and/or seasons.

8.3.0.8 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate recreationists and encourage landowners to eliminate garbage in the vicinity of suitable wildlife habitat, in particular SGCN habitat. Information should include the detrimental impacts garbage may have on various wildlife species.

8.3.0.9 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners and land managers to include only native plants in landscaping and restoration projects. Provide information to assist them in detecting problematic establishment of invasive, non-indigenous plants.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.14 Develop an educational outreach program using a variety of media to ensure maximizing the distribution of information, in particular targeting sportsmen's organizations and fisheries, regarding the unintended effects abandoned fishing gear, tackle and crab pots can have on wildlife, including non-target species.

8.3.0.24 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

8.3.0.25 Develop educational outreach programs for landowners, nurseries and the general public regarding the negative impacts of invasive and non-native plants on our natural communities.

8.3.0.26 Develop educational outreach programs for private and public landowners and land managers regarding the importance of and how to manage core forests and forested corridors in a way that will be beneficial for SGCN, particularly endangered, threatened and special concern species.

8.3.0.27 Develop educational outreach programs for public and private landowners and land managers regarding the importance of structural habitat diversity, methods to increase diversity, and/or incentive programs available to increase habitat diversity.

8.3.0.29 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about the importance of maintaining a vegetative buffer along riparian and aquatic habitats to intercept storm water runoff and minimize soil erosion.

8.3.0.30 Develop educational outreach programs for private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.4 Develop a plan that directs the creation of new impoundments and/or the expansion of bogs for cranberry farming within or immediately adjacent to critical forested habitats in a manner that minimizes impacts on the natural hydrology of the watershed and subsequently, the natural wetlands in the area.

9.1.0.5 Develop a plan that directs the creation or expansion of energy or utility rights-of-way in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.6 Develop a plan that directs the creation or expansion of roads and railroads or the re-establishment of abandoned railroads within and adjacent to critical forested habitats in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.9 Develop a plan that focuses on strategies to minimize the creation of renewable energy farms (e.g., solar, wind) and related infrastructures within and their impacts on forested habitats and the wildlife community.

9.1.0.10 Develop a plan that focuses on strategies to minimize the impacts of mining on critical forested habitats.

9.1.0.12 Develop a plan to avoid freshwater tidal management.

9.1.0.13 Develop a plan to minimize agriculture that would result in groundwater withdrawal in critical forested areas.

9.1.0.14 Develop a plan to minimize development that would result in groundwater withdrawal in critical forested areas.

9.1.0.15 Develop a plan to minimize fragmentation of terrestrial and aquatic habitats by roads.

9.1.0.16 Develop a plan to minimize new lawnscapes and preserve natural vegetation within and adjacent to critical forest areas.

9.1.0.17 Develop a plan to minimize nutrient and effluent loads from aquaculture practices.

9.1.0.18 Develop a plan to minimize the effects of road widening and traffic volume increases within critical wildlife habitat areas using CHANJ products.

9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

9.1.0.20 Develop a plan to minimize the impacts of existing agricultural properties adjacent to and the conversion of forest habitats (terrestrial and aquatic, within or adjacent to critical forests) to agriculture, grazing areas/livestock farms, and plantations.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.23 Develop a plan to mitigate the effects of transportation barriers by using CHANJ products.

9.1.0.27 Develop a plan to use wildlife-appropriate culverts in critical forested areas.

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.31 Develop wetland restoration plans that consider the life history and needs of wildlife occupying targeted habitats.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.2 Organizational strategic and CMS planning

9.2.1 Organizational strategic and operational planning

9.2.1.1 Identify and codify legal ORV access areas on state lands.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.5 Develop response plans to address disease outbreaks within wildlife populations, in particular SGCN.

9.3.1.7 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.10 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.16 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.2 Listed species recovery planning

9.3.2.1 Develop proactive species recovery plans for all endangered and threatened species including guidance and objectives pertaining to critical and supporting habitat to meet and maintain recovery goals.

9.3.3 Habitat management planning

9.3.3.5 Develop a management plan using forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

9.3.3.6 Develop a management plan for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

9.3.3.7 Develop a management plan to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

9.3.3.8 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.3.9 Develop a response plan to outbreaks using BMPs to control infestations and limit their spread in a way that avoids excessive harm to non-target species.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.3.13 Develop a management plan that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas and prevents or ameliorates near-term impacts of climate change throughout the State, but in particular within the coastal and Delaware Bay areas.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.16 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.3.17 Develop a management plan for prescribed burning that will benefit Pinelands dependent species and increase or maintain habitat quality for these species in the Pinelands.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.21 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.3.22 Create management plans to minimize and/or prevent wildlife road mortality that will incorporate wildlife passages in conjunction with barrier fencing and, where possible, seasonal closures. Aquatic-associated passages must avoid disturbance to the natural streambeds and riparian habitat, permit high volumes of water to flow freely, and provide adequate travel corridors for terrestrial wildlife, while maintaining stream flow for fish passage. Bridges that span rivers and streambeds and include floodplain habitat on either side of the span to provide travel corridors for terrestrial wildlife are preferred over culverts.

9.3.3.24 Develop a plan to improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

9.3.3.27 Develop a management plan to expand breeding habitat and connectivity for tiger salamanders and other obligate vernal pool breeders.

9.3.3.29 Develop habitat management plans aimed at reducing or eliminating negative impacts of ORVs.

9.3.3.32 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3.34 Include controlled burn prescriptions in forest and stewardship plans to improve wildlife habitat.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.3 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.9 Review strategies for creating or enhancing connectivity (e.g., installing appropriately-sized wildlife passages) between wetlands to allow wildlife to disperse naturally and safely.

11.1.1.10 Use CHANJ mapping in reviews of proposed energy, mining, transportation and utility service companies/agencies' projects to attempt to maintain habitat connectivity and reduce fragmentation, and identify potential impacts of the projects.

11.1.1.12 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed solar farm projects to reduce habitat fragmentation and minimize impacts on wildlife.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.2.2 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.2.4 Review strategies for creating or enhancing connectivity (e.g., installing appropriately-sized wildlife passages) between wetlands to allow wildlife to disperse naturally and safely.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.2 Provide technical support to public and private landowners and land managers for controlling invasive, native and non-native plant species in order to increase structural habitat diversity.

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.7 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on the importance of maintaining habitat connectivity, minimizing fragmentation, and the use of CHANJ products to help them target areas for such planning.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.11 Provide educational resources, training programs, and on-the-ground guidance to private and public landowners and land managers on the benefits of and for creating young forest and early succession habitat for SGCN.

11.2.0.14 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters), and to enhance or restore biologically appropriate buffers.

11.2.0.15 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and landowners about the importance of retaining and in an effort to protect, create, enhance and/or restore vegetation along aquatic habitats.

11.2.0.16 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

11.2.0.17 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of vernal pools and the protection, enhancement and/or restoration of biologically appropriate buffers.

11.2.0.18 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats.

11.2.0.22 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

11.2.0.23 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to SGCN habitats to promote the protection and/or enhancement of those adjacent habitats to increase the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and that connect conserved SGCN habitats.

11.2.0.24 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers on how to manage vegetated roadside areas (e.g., mowing, brush-hogging, etc.) on a schedule that avoids peak activity periods for wildlife and therefore, minimizes harm.

11.2.0.25 Provide educational resources, training programs, and on-the-ground guidance to resource managers regarding the assessment of and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) related to residential and commercial development.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.1 Engage partners and stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.3 Provide educational resources, training programs, and on-the-ground guidance to DOD to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop and implement forest management and other practices that minimize disturbances to SGCN (i.e., beyond their federal requirements).

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

100 Law and Policy

100. Legislation

100.1.3 Sub-national Level

100.1.3.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.3.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.4 County and Local

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.3 Expand the acreages and enhance the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN through local ordinances.

100.1.4.4 Secure wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and biologically appropriate buffers through local ordinances.

100.1.4.5 Secure SGCN-inhabited/used freshwater wetlands and biologically appropriate buffers through local ordinances.

100.1.4.7 Secure vernal pools and biologically appropriate buffers through local ordinances.

100.1.4.10 Secure critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through local ordinances.

100.1.4.11 Secure riparian areas through local ordinances.

100.1.4.14 Adopt/pass local ordinances which require assessing and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.5.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.5.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into state/local policy to minimize the impact of aquaculture on fish and wildlife.

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.1 Develop (and/or improve) policies and/or regulations that will promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

100.3.0.5 Develop policies that will promote improved and secure habitat connections between conserved SGCN habitats.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.10 Develop policies that promote protecting vernal pool habitats to benefit SGCN that rely upon them and promotes connectivity of SGCN populations.

100.3.0.12 Develop policies that promote the preservation and protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.13 Develop policies that will promote protecting and restoring riparian areas.

100.3.0.14 Develop policies and/or regulations that increase the protective buffers of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) to biologically appropriate distances to benefit SGCN that rely upon these habitats and improve the function of the [associated] aquatic systems.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.21 Develop policies that minimize wildlife road mortality through: 1) Requiring the integration of wildlife passages into all new and repaired roads, in particular those areas that will connect SGCN habitats, 2) Requiring current fish/wildlife passages be improved and maintained in perpetuity, 3) Supporting seasonal road closures, in particular for unimproved roads, 4) Supporting projects that work to improve connectivity of SGCN habitats such as land conservation through acquisition or other means.

100.3.0.23 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.31 Create or expand tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMPs.

100.3.0.32 Coordinate regulations across agencies to maximize availability of and enrollment in existing Forestry Stewardship Programs (e.g., "Woodland Stewards", Farm Bill, partners, etc.) to maintain and/or improve forest habitat.

100.3.0.40 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.45 Increase the controlled burn season to focus on restoring vegetative communities.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.49 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address the issue of disturbance to habitat or species as a result of human activities (e.g., construction, bridge maintenance, road work, etc.).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.53 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded rights-of-way corridors associated with energy transport/transmission.

100.3.0.54 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded surface mining areas.

100.3.0.57 Develop regulations that when implemented will improve and secure habitat connections between conserved SGCN habitats.

100.3.0.58 Develop regulations that when implemented will promote the expansion of acreages and enhancement of the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.61 Develop regulations that when implemented will protect vernal pool habitats to benefit SGCN that rely upon them and promotes connectivity of SGCN populations.

100.3.0.63 Develop regulations that when implemented will preserve and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.64 Develop regulations that when implemented will protect and restore riparian areas.

100.3.0.69 Develop regulations that when implemented will minimize wildlife road mortality.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100.3.0.73 Develop regulations that would exempt the conversion of lawns to native vegetation (beneficial to wildlife) from local lawn ordinances.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.2 Create a policy that requires the NJ DEP to incorporate scientific information regarding climate change and sea level rise (e.g., predictions, habitat management/acquisition efforts to enhance resilience to inundation) on their websites and to work with other government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

100.4.0.3 Develop policies for mandatory buffer strips on preserved farmlands and state-owned agricultural lands.

100.4.0.4 Create a policy that requires the use of wildlife habitat and corridor mapping products for both regulatory use when conducting project reviews and planning/siting new or expanded rights-of-way projects.

100.4.0.8 Develop a white paper addressing the impacts that existing, new or expanded rights-of-way have upon wildlife, wildlife habitats and habitat connectivity.

100.4.0.9 Develop and implement policies to minimize the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats in order to benefit wildlife.

100.4.0.12 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.4.0.13 Develop policies for different circumstances (e.g., roadsides and medians, riparian, aquatic and terrestrial habitats) that outline appropriate habitat/vegetation management strategies and schedules to minimize risks to and benefit wildlife.

100.4.0.16 Develop policies to implement habitat management strategies that will increase the structural diversity surrounding areas used for energy, mining, and transportation and service corridors which include but are not limited to the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-

100.4.0.17 Develop policies to implement habitat management strategies, including prescribed burns, that will increase the structural diversity on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies to control and reduce the impacts of invasive, non-native species in order to increase structural habitat diversity.

100.4.0.18 Develop policies to minimize the extent of infrastructure associated with energy and service corridors or areas (e.g., wind and solar farms, pipelines, utility lines) and that require the implementation of habitat management strategies that will increase the structural diversity in the area including (e.g., the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides).

100.4.0.19 Develop regulations that will minimize the creation of new barriers, remove or replace current barriers with appropriately-sized systems to accommodate wildlife dispersal, and to minimize road widening and traffic volume increases within critical wildlife habitat areas.

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Wood Turtle

Focal species that comprise this Conservation Target:

Wood Turtle

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:

- 1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.1.1.2 Loss, alteration and/or degradation of habitat.
- 1.1.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.
- 1.1.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.
- 1.1.1.5 Impervious surfaces can lead to a decrease in water recharge.
- 1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.
- 1.1.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:

- 1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.2.1.2 Loss, alteration and/or degradation of habitat.
- 1.2.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.
- 1.2.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.
- 1.2.1.5 Impervious surfaces can lead to a decrease in water recharge.
- 1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.
- 1.2.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:

- 1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.3.1.2 Loss, alteration and/or degradation of habitat.
- 1.3.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.
- 1.3.1.4 Impervious surfaces can lead to a decrease in water recharge.

1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.3.1.6 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture (Avg. Score: 2.00)

NJ Specific Threats:

2.1.1.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.1.3 Conversion of agricultural landscape that results in increased erosion, runoff, and chemical and thermal pollution decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.1.1.5 Lack of competitive market prices to maintain native grasslands causes conversion to other crops that have more monetary value but less value as wildlife habitat.

2.1.2 Small-holder Farming (Avg. Score: 1.00)

NJ Specific Threats:

2.1.2.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.2.2 Fragments terrestrial and aquatic habitats.

2.1.2.3 Agricultural practices (e.g., mechanized, row-crop agriculture) can render lands unsuitable for most wildlife due to soil degradation and erosion.

2.1.2.4 Agricultural practices (e.g., mechanized, row-crop agriculture) can cause direct mortality to wildlife when harvesting takes places.

2.1.2.5 Lack of competitive market prices to maintain native grasslands causes conversion to other crops that have more monetary value but less value as wildlife habitat.

2.1.3 Agro-industry (Avg. Score: 2.00)

NJ Specific Threats:

2.1.3.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.3.2 Fragments terrestrial and aquatic habitats.

2.1.3.3 Agricultural practices (e.g., mechanized, row-crop agriculture) can render lands unsuitable for most wildlife due to soil degradation and erosion.

2.1.3.5 Loss of ecotones by implementing clean farming (edge-to-edge) practices degrades habitat for early successional wildlife.

2.1.3.6 Lack of competitive market prices to maintain native grasslands causes conversion to other crops that have more monetary value but less value as wildlife habitat.

2.2 Wood and Pulp Plantations

2.2.1 Small Holder (Avg. Score: 2.00)

NJ Specific Threats:

2.2.1.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.2.1.2 Tree harvesting can cause direct mortality to wildlife, especially if done during peak activity periods or vulnerable life stages (e.g., denning, nesting, gestation/birthing, basking, roosting, pre-volancy, etc.).

2.2.2 Agro-industry Plantations (Avg. Score: 1.00)

NJ Specific Threats: 2.2.2.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.2.2.2 Tree harvesting can cause direct mortality to wildlife, especially if done during peak activity periods or vulnerable life stages (e.g., denning, nesting, gestation/birthing, basking, roosting, pre-volancy, etc.).

2.3 Livestock Farming and Ranching

2.3.2 Small-holder Grazing (Avg. Score: 1.00)

NJ Specific Threats: 2.3.2.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.2.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

2.3.2.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.2.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

2.3.3 Agro-industry Grazing (Avg. Score: 1.00)

NJ Specific Threats: 2.3.3.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.3.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

2.3.3.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.3.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

3 Energy Production and Mining

3.1 Oil and Gas Facilities and Pipelines

3.1.1 Distribution processes of petroleum and other liquid hydrocarbons (Avg. Score: 2.00)

NJ Specific Threats: 3.1.1.1 Fragments terrestrial and aquatic habitats.

3.1.1.2 Loss, alteration and/or degradation of habitat.

3.1.1.3 Increased risk of oil spills.

3.1.1.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.

3.1.2 Natural gas distribution processes (Avg. Score: 2.00)

NJ Specific Threats: 3.1.2.1 Fragments terrestrial and aquatic habitats.

3.1.2.2 Loss, alteration and/or degradation of habitat.

3.1.2.3 Increased risk of gas leaks and explosions.

3.1.2.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.

3.2 Mining and Quarrying

3.2.2 Surface Mining - Rock Quarry (and sand quarries) (Avg. Score: 2.00)

NJ Specific Threats: 3.2.2.1 Fragments terrestrial and aquatic habitats.

3.2.2.2 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

3.2.2.3 Increased risk of vehicle strikes/mortality to wildlife.

3.3 Renewable Energy

3.3.1 Wind Power (Avg. Score: 1.00)

NJ Specific Threats: 3.3.1.2 Fragments terrestrial habitats.

3.3.1.3 Loss, alteration and/or degradation of habitat.

3.3.1.4 Increased commercial infrastructure.

3.3.2 Solar Power (Avg. Score: 2.00)

NJ Specific Threats: 3.3.2.1 Fragments terrestrial habitats.

3.3.2.2 Loss, alteration and/or degradation of habitat.

3.3.2.3 Increased commercial infrastructure.

3.4 Conventional Power Plants

3.4.0 Conventional Power Plants (Avg. Score: 2.00)

NJ Specific Threats: 3.4.0.2 Loss, alteration and/or degradation of habitat due to new or the expansion of current facilities.

3.4.0.3 Alteration of the temperature, pH and/or hydrology of aquatic ecosystems change plant communities and can harm wildlife and/or impact their behavior and survivorship.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats: 4.1.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species and inhibiting dispersal of non-volant animals, reducing gene flow.

4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.1.1.4 Re-establishment of abandoned railroad lines may increase the risk of direct mortality on wildlife.

4.1.1.5 Re-establishment of abandoned railroad lines may decrease turtles' abilities to disperse due to their difficulty traversing the railroad ties and tracks, leading to decreased genetic exchange.

4.1.2 Movement of cars and other vehicles on roads and railroads (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats: 4.1.2.1 Increased vehicle traffic increases the risk of wildlife mortality from strikes.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads (Avg. Score: 2.00)

NJ Specific Threats: 4.2.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species, inhibiting dispersal of non-volant animals, reducing gene flow, and creating barriers to fish when service line-associated roads cross streams (e.g., bridges, culverts, fords, etc.).

4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

4.2.1.4 Lines that cross or run parallel to streams result in a loss or reduction of vegetated riparian buffers and streamside shading, affecting water quality and in-stream habitat for aquatic biota.

4.2.2 Management of rights-of-way or communication tower facilities and/or their associated access roads (Avg. Score: 2.00)

NJ Specific Threats: 4.2.2.1 Improper or poorly scheduled vegetation management can cause direct mortality to and may reduce productivity of wildlife.

4.3 Shipping Lanes

4.3.2 Dredging impacts (Avg. Score: 1.00)

NJ Specific Threats: 4.3.2.1 Threatens wildlife by disrupting/removing stream bottom habitat.

4.3.2.3 Transportation of materials to and from disposal facilities may pose temporary disturbance to wildlife impacting foraging and nesting success.

5 Biological Resource Use

5.1 Hunting and Collecting Terrestrial Animals

5.1.1 Intentional Use (Avg. Score: 3.00)

NJ Specific Threats: 5.1.1.1 Illegal collection of wildlife can have detrimental impacts on populations.

5.1.2 Unintentional effects (Avg. Score: 1.00)

NJ Specific Threats: 5.1.2.2 Disruption of normal wildlife behavior.

5.2 Gathering Terrestrial Plants

5.2.3 Control (Avg. Score: 1.00)

NJ Specific Threats: 5.2.3.2 Clearing of scrub-shrub vegetation [and snags] diminishes cover and nesting habitat.

5.2.3.3 Removal of riparian or near-stream vegetation alters water quality and in-stream habitat for aquatic organisms by reducing streamside shading, increasing bank erosion, and affecting the natural filtering ability of trees, shrubs, and grasses.

5.3 Logging and Wood Harvesting

5.3.1 Intentional Use (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.1.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.1.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.1.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.1.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.1.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.2 Intentional Use (large scale) (Avg. Score: 2.00)

NJ Specific Threats: 5.3.2.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.2.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.2.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.2.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.2.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.3 Unintentional effects (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.3.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.3.2 Poorly planned/implemented tree harvesting adjacent to waterways and vernal pools can lead to increased water temperatures, soil erosion and sedimentation, and reduces the potential for woody debris within the aquatic system, leading to negative impacts on wildlife.

5.3.4 Unintentional effects (large scale) (Avg. Score: 2.00)

NJ Specific Threats: 5.3.4.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4.2 Extensive infrastructure and larger equipment requirements present a potential risk of direct injury/mortality to wildlife.

5.3.4.3 Poorly planned/implemented tree harvesting adjacent to waterways and vernal pools can lead to increased water temperatures, soil erosion and sedimentation, and reduces the potential for woody debris within the aquatic system, leading to negative impacts on wildlife.

5.3.4.4 Infrastructure and/or equipment use may result in subtle changes to drainage patterns, adversely affecting vernal pool and wetland hydrology.

5.3.4.5 Lack of appropriate, sustainable forest management can lead to a decrease in forest habitat diversity, degraded habitat for many forest species, the loss of habitat for early-successional species, and/or the loss of unique habitats for species that need canopy breaks and multi-aged tree composition to fulfill various life history requirements.

5.4 Fishing and Harvesting of Aquatic Resources

5.4.1 Intentional Use (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.4.1.4 Illegal collection of aquatic and semi-aquatic wildlife can have detrimental impacts on populations.

5.4.2 Intentional Use (large scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.4.2.4 Illegal collection of aquatic and semi-aquatic wildlife can have detrimental impacts on populations.

5.4.3 Unintentional effects (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.4.3.7 Improperly sanitized equipment, relocation of fish, importation and release of non-native species, and the use of bait from a different location can spread invasive species and diseases from one waterbody to another.

5.4.4 Unintentional effects (large scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.4.4.7 Improperly sanitized equipment, relocation of fish, use of bait from a different location, can spread invasive species and diseases from one waterbody to another.

5.4.5 Persecution/Control (Avg. Score: 1.00)

NJ Specific Threats: 5.4.5.2 Illegal collection of protected turtle species as a result of misidentification as a snapping turtle which has a limited season for harvest.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized) (Avg. Score: 2.00)

NJ Specific Threats: 6.1.1.1 Inappropriate use of off-road vehicles creates new roads/trails which fragments habitat.

6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.

6.1.1.3 Increased risk of harassment that results in a change in wildlife behavior and/or direct mortality from vehicle strikes.

6.1.1.6 Off-road vehicles can be a mechanism of transference of wildlife diseases and invasive plant species if gear and apparel are not properly sanitized between sites.

6.1.2 Boating (Avg. Score: 1.00)

NJ Specific Threats: 6.1.2.5 Watercraft can be a mechanism of transference of wildlife diseases and invasive plant species if gear is not properly sanitized between sites.

6.1.5 Wildlife observation and photography (Avg. Score: 1.00)

NJ Specific Threats: 6.1.5.1 Improperly conducted recreational activities may disrupt normal wildlife behaviors which can result in reduced reproductive success or survival, abandonment of critical sites, etc.

6.1.5.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.2 Military Exercises

6.2.1 Military exercises (Avg. Score: 2.00)

NJ Specific Threats: 6.2.1.1 Military testing and training exercises may inflict disturbance and potential physical harm to wildlife.

6.2.1.3 Lack of opportunity for non-federal wildlife managers to influence activities on military bases may result in detrimental impacts to SGCN and/or missed opportunities to engage in projects that benefit SGCN.

6.3 Work and Other Activities

6.3.1 Unauthorized research projects at significant habitats (Avg. Score: 2.00)

NJ Specific Threats: 6.3.1.1 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.1.2 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.2 Authorized research projects at significant habitats (Avg. Score: 2.00)

NJ Specific Threats: 6.3.2.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.2.3 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.3 Other "work" unrelated to research (Avg. Score: 2.00)

NJ Specific Threats: 6.3.3.1 Construction projects may disrupt normal wildlife behavior which can result in reduced reproductive success or survival, abandonment of critical sites, etc. (e.g., bridge-nesting birds).

6.3.3.4 Workers may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

7 Natural Systems Modifications

7.1 Fire and Fire Suppression

7.1.1 Increase in Fire Frequency/Intensity (Avg. Score: 2.00)

NJ Specific Threats: 7.1.1.1 Increase in frequency and intensity of wild fires as a result of droughts and heat waves drying out vegetation and litter.

7.1.1.2 Increase in frequency of wild fires as a result of illegal activities.

7.1.1.3 Unnatural fire regimes occurring as a result of military exercises.

7.1.2 Suppression of Fire Frequency/Intensity (Avg. Score: 2.00)

NJ Specific Threats: 7.1.2.1 Shift in vegetative communities as a result of suppression of natural fires.

7.1.2.2 Lack of diversity in age structure and composition of vegetation due to the suppression of fire.

7.2 Dams and Water Management/Use

7.2.1 Abstraction of Surface Water (domestic use) (Avg. Score: 2.00)

NJ Specific Threats:

7.2.1.1 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.1.2 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.1.3 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, and eliminates shallow water habitats.

7.2.2 Abstraction of Surface Water (commercial use) (Avg. Score: 2.00)

NJ Specific Threats:

7.2.2.1 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, eliminates shallow water habitats, and disrupts/removes stream bottom habitat.

7.2.2.2 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.2.3 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.3 Abstraction of Surface Water (agricultural use) (Avg. Score: 2.00)

NJ Specific Threats:

7.2.3.1 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.3.2 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, and eliminates shallow water habitats.

7.2.3.5 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.5 Abstraction of Ground Water (domestic use) (Avg. Score: 2.00)

NJ Specific Threats:

7.2.5.1 Heavy withdrawal of ground water for domestic use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.6 Abstraction of Ground Water (commercial use) (Avg. Score: 2.00)

NJ Specific Threats:

7.2.6.1 Heavy withdrawal of ground water for industrial and commercial use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.7 Abstraction of Ground Water (agricultural use) (Avg. Score: 2.00)

NJ Specific Threats:

7.2.7.1 Heavy withdrawal of ground water for agricultural use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.9 Small Dams (Avg. Score: 2.00)

NJ Specific Threats:

7.2.9.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.9.3 Dams act as a barrier to movement, limiting the ability of aquatic or semi-aquatic wildlife to move safely between habitats.

7.2.10 Large Dams (Avg. Score: 2.00)

NJ Specific Threats:
7.2.10.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.10.3 Dams act as a barrier to movement, limiting the ability of aquatic or semi-aquatic wildlife to move safely between habitats.

7.2.11 Dams (size unknown) (Avg. Score: 2.00)

NJ Specific Threats:
7.2.11.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.11.3 Dams act as a barrier to movement, limiting the ability of aquatic or semi-aquatic wildlife to move safely between habitats.

7.2.12 Culverts (Avg. Score: 2.00)

NJ Specific Threats:
7.2.12.1 Improper design, placement, installation and maintenance of culverts and other stream crossing structures can impede or prevent the movements of terrestrial organisms and can restrict or limit stream flow, impeding the movement of aquatic organisms along riparian corridors.

7.2.13 Stream Burial (Avg. Score: 2.00)

NJ Specific Threats:
7.2.13.1 Eliminates riparian habitats.

7.2.13.2 Eliminates in-stream habitat and water resources for wildlife.

7.2.13.3 Alters the hydrology and quality of downstream aquatic and riparian habitats.

7.3 Other Ecosystem Modifications

7.3.2 Inappropriate timing of mowing (Avg. Score: 3.00)

NJ Specific Threats:
7.3.2.1 Increased risk of direct mortality and/or reduced productivity of wildlife, as well as reduced use by migrating species.

7.3.3 Removal of coarse woody debris (streams, forests, scrub-shrub habitats) (Avg. Score: 2.00)

NJ Specific Threats:
7.3.3.1 Decreases the available detritus that normally accumulates behind and within stream obstructions, minimizing or eliminating food sources and shelters for fishes, invertebrates and amphibians.

7.3.3.2 Decreases habitat and/or corridor suitability due to limited or absent shelter and foraging habitat.

7.3.3.3 Removal of dead trees (snags), large felled logs (i.e., those > 12" dbh), and other downed woody material diminishes nesting, roosting, and sheltering options for wildlife, and increases the ease at which deer can browse regenerating vegetation.

7.3.3.4 Decreases available basking, shelter, and foraging habitats.

7.3.4 Lack of natural disturbance patterns or ecosystem functions due to species loss (Avg. Score: 1.00)

NJ Specific Threats:
7.3.4.5 The lack of forest disturbance minimizes the diversity of herbaceous vegetation and other shrubs and trees that need a lot of sunlight to grow.

7.3.5 Poor habitat management (Avg. Score: 1.00)

NJ Specific Threats:
7.3.5.1 Improper or poorly scheduled maintenance of man-made corridors (e.g., roadsides and medians) can cause direct mortality to and may reduce productivity of wildlife.

7.3.5.2 Shifting from natural vegetation to lawns can cause increased temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

7.3.5.3 Vegetation clearing removes terrestrial and riparian corridors for animal movement, shelter, and resting areas.

7.3.5.4 Vegetation clearing or inappropriate alteration adjacent to aquatic habitats threatens aquatic species by degrading habitat and water quality (altering temperature and dissolved oxygen, increasing siltation and desiccation, etc.).

7.3.5.5 Habitat management that alters or removes vegetation without implementing long-term management increases the risk of invasive and exotic plants establishing themselves, outcompeting native vegetation.

7.3.5.6 Habitat management, including that which occurs on public and private lands, that does not consider timing and species' behaviors can result in the direct mortality and/or alteration or loss of habitat.

7.3.5.7 Improperly planned habitat management and/or mitigation efforts along roadsides and within the medians can attract wildlife and increase the risk of vehicle strikes.

7.3.5.9 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, eliminates shallow water habitats, and disrupts/removes stream bottom habitat.

7.3.5.10 Ditching, draining and filling of marshes and wetlands eliminates habitat and degrades the remaining surrounding areas for wildlife.

7.3.5.12 Lack of diversity in age structure and composition of vegetation due to lack of natural disturbances and/or vegetation management.

7.3.5.13 Private landowners with rare species on their properties are not always cooperative in the protection and management of the species' habitats. Landowners may be held accountable for their actions when they cause harm to the species or destroy the habitat, but it is often too late for the species' population.

7.3.5.14 Intentional felling and removal of dead standing trees or snags eliminates resting, nesting or feeding habitat, and precludes the snags eventual contribution to coarse woody debris and forest floor structure and habitat.

7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species (Avg. Score: 2.00)

NJ Specific Threats:

8.1.1.1 Displace or outcompete native species for resources.

8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.

8.1.1.3 Invasive, non-native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

8.1.1.4 Invasive, non-native animals increase the risk of predation on native animals and/or herbivory on native vegetation.

8.1.1.5 Invasive, non-native animals and plants increase the risk of introduction and transference of diseases

8.1.1.6 Invasive, non-native plants may create physical barriers for some species.

8.1.2 Invasive non-native aquatic animals (Avg. Score: 2.00)

NJ Specific Threats:

8.1.2.2 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminishing habitat suitability and reducing ecological integrity of natural communities, and may introduce disease into a population.

8.1.3 Invasive non-native aquatic plants (Avg. Score: 2.00)

NJ Specific Threats: 8.1.3.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.4 Invasive non-native terrestrial/wetland animals (Avg. Score: 1.00)

NJ Specific Threats: 8.1.4.1 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.4.2 Free-roaming and feral domestic animals such as cats and dogs causes direct mortality of wildlife and disturbance to wildlife breeding and resting areas.

8.1.5 Invasive non-native terrestrial/wetland plants (Avg. Score: 1.00)

NJ Specific Threats: 8.1.5.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.6 Invasive non-native fungal/bacterial diseases (Avg. Score: 2.00)

NJ Specific Threats: 8.1.6.1 The introduction of non-native fungal and bacterial diseases threatens native populations and ecosystems.

8.2 Problematic Native Species/Diseases

8.2.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.2.1.1 Overabundant native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

8.2.1.2 Invasive pathogens and insects may increase in range and abundance as limiting factors (such as temperature) are altered as a result of climate change.

8.2.1.3 Invasive, native species can out-compete non-invasive species for resources (food, light, shelter), leading to the demise of some species populations.

8.2.1.4 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.2.2 Named Species (Avg. Score: 2.00)

NJ Specific Threats: 8.2.2.2 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.4 Problematic Species/Diseases of Unknown Origin

8.4.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.4.1.1 Non-native or poorly understood diseases and parasites could potentially impact native animals.

8.4.2 Named Species (Avg. Score: 1.00)

NJ Specific Threats: 8.4.2.2 Diseases of unknown origin, such as snake fungal disease and Ranavirus, can cause significant mortality among native animal populations.

8.5 Viral/Prion-induced Diseases

8.5.1 Unspecified Species (Disease) (Avg. Score: 1.00)

NJ Specific Threats: 8.5.1.1 There is a large knowledge gap regarding the existence of, or potential for, other diseases impacting native wildlife.

8.5.2 Named Species (Disease) (Avg. Score: 1.00)

NJ Specific Threats: 8.5.2.1 Diseases such as West Nile Virus, arenavirus, sudden oak death, Avian Influenza, and snake fungal disease cause morbidity or mortality to native populations.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.1 Domestic and Urban Waste Water

9.1.1 Sewage (Avg. Score: 2.00)

NJ Specific Threats: 9.1.1.1 Degradation of aquatic and marine water quality and habitats by changing turbidity, flow and water chemistry.

9.1.1.2 Leads to increased eutrophication and algae blooms that result in oxygen depletion.

9.1.1.3 Contaminants in sewage treatment effluents and Combined Sewer Overflows can cause developmental and behavioral abnormalities and reproductive failure in wildlife.

9.1.2 Run-off (Avg. Score: 2.00)

NJ Specific Threats: 9.1.2.1 Chemical fertilizers and nutrient run-off changes the pH in streams and ponds and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.1.2.2 Contaminants degrade aquatic and marine water quality and can bioaccumulate in benthic organisms, threatening wildlife by causing developmental and behavioral abnormalities and reproductive failure.

9.1.2.3 Contaminants from road runoff (oil, sediment, salt, etc.) impact native vegetation and the species that rely upon them, degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2 Industrial and Military Effluents

9.2.1 Oil Spills (Avg. Score: 2.00)

NJ Specific Threats: 9.2.1.1 Oil spills render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.1.2 Oil spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.1.3 Oil spills cause external oiling of wildlife and ingestion of oil, both of which can injure or kill wildlife.

9.2.2 Seepage from Mining (Avg. Score: 2.00)

NJ Specific Threats: 9.2.2.1 Contaminants from mining degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2.3 Other (Avg. Score: 2.00)

NJ Specific Threats: 9.2.3.1 Point and nonpoint source pollution such as polychlorinated biphenyls (PCBs), pesticides, heavy metals, and endocrine disrupting compounds (EDC's) into freshwater and marine systems pose threats to wildlife through direct contact and/or ingestion, and to aquatic species and their predators through bioaccumulation, impacting the reproductive success and neurological function of many avian and fish species.

9.2.3.2 Chemical spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.3.3 Chemical spills may render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.4 Other: Hydrofracturing (Avg. Score: 1.00)

NJ Specific Threats: 9.2.4.1 Contaminants from hydrofracturing degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2.4.2 Uncontrolled effluents escaping from hydrofracturing facilities can cause injury to wildlife and alter normal behaviors.

9.2.5 Other: Industrial toxic settling ponds (Avg. Score: 1.00)

NJ Specific Threats: 9.2.5.1 Surficial or open industrial effluent ponds can cause injury or death to wildlife that become exposed through ingestion or submersion.

9.3 Agricultural and Forestry Effluents

9.3.1 Nutrient Loads (Avg. Score: 2.00)

NJ Specific Threats: 9.3.1.1 Chemical fertilizers and nutrient run-off changes the pH in streams, ponds and wetlands and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.3.1.2 Animal waste degrades terrestrial and aquatic habitats, especially streams, ponds and wetlands, resulting in eutrophication, which disrupts oxygen and nutrient balances, and causes injury and mortality to aquatic organisms.

9.3.1.4 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades wetland and aquatic habitats with runoff, increasing sediment and nutrient loads and pH.

9.3.1.5 Conversion of native forests to plantations degrades wetland and aquatic habitats through increased runoff.

9.3.2 Soil Erosion and Sedimentation (Avg. Score: 2.00)

NJ Specific Threats: 9.3.2.1 Soil erosion, sedimentation and destruction of streambanks and riparian buffers degrade waters making them unsuitable for riparian-dependent wildlife.

9.3.2.3 Conversion of native forests to plantations degrades wetland and aquatic habitats through increased sedimentation.

9.3.3 Herbicides and Pesticides (Avg. Score: 1.00)

NJ Specific Threats: 9.3.3.1 Pesticides degrade terrestrial and aquatic habitats, especially streams, ponds and wetlands. Aquatic wildlife are particularly sensitive to these contaminants, which can cause developmental and behavioral abnormalities and reproductive failure. Some contaminants may bioaccumulate in predatory fish and birds and disrupt reproduction.

9.3.3.2 Use of rodenticides can cause secondary actions of injury and death to animals in the course of scavenging.

9.3.3.3 Use of pesticides can directly harm non-target species through direct contact and/or by reducing and/or contaminating their food supply.

9.3.4 Other (Avg. Score: 1.00)

NJ Specific Threats: 9.3.4.1 Spills, leaks or discharges of fuel, oil or other contaminant fluids from machinery or equipment used in the normal course of agricultural or forestry activities can degrade or destroy adjacent aquatic and terrestrial habitats and/or cause harm to non-target species (plants and animals).

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture (Avg. Score: 1.00)

NJ Specific Threats: 9.3.5.4 Improper use of current insecticides, such as those containing esfenvalerate, prallethrin, or piperonyl butoxide, or past use of pesticides containing chlordane still present in the soils, are toxic to various wildlife species, and can cause injury, mortality, or other effects that impair population viability.

9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.4 Garbage and Solid Waste

9.4.1 Direct hazards to wildlife (Avg. Score: 1.00)

NJ Specific Threats: 9.4.1.2 Garbage and solid waste destroys natural habitats and obstructs wildlife movements.

9.5 Air-Bourne Pollutants

9.5.1 Acid Rain (Avg. Score: 1.00)

NJ Specific Threats: 9.5.1.1 Causes acidification of water bodies, resulting in changes to aquatic and marine communities and reducing biodiversity, and creating conditions that are unsuitable for some aquatic (freshwater and marine) and semi-aquatic species that are sensitive to pH shifts.

9.5.1.2 Leaches calcium from the soils which in turn reduces the availability of prey, particularly calcium-rich prey such as snails.

9.5.6 Herbicides and Pesticides (Avg. Score: 2.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

9.6 Excess Energy

9.6.2 Thermal Pollution (Avg. Score: 1.00)

NJ Specific Threats: 9.6.2.2 Water temperature changes to aquatic systems can deter or preclude use by SGCN (e.g., alter habitat suitability for wildlife species, reduce prey base) or present stressors that are harmful if not fatal to wildlife.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 1.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.2 Droughts

11.2.1 Droughts (Avg. Score: 2.00)

NJ Specific Threats: 11.2.1.1 Contribute to hardened soils, decreasing water recharge during rains and increasing the likelihood of flash floods during storms.

11.2.1.2 Lead to lower groundwater levels and therefore, less available water for people and habitats.

11.2.1.3 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

11.3 Temperature Extremes

11.3.1 Temperature extremes (Avg. Score: 2.00)

NJ Specific Threats: 11.3.1.1 Increasing temperatures may cause habitat loss and degradation by desiccating and/or raising the temperatures of small wetlands and streams leading to the loss of freshwater mussels and other aquatic species and species reliant upon these habitats.

11.3.1.2 Increased temperatures can negatively impact wetland, riverine, lacustrine and vernal pool-associated or -dependent wildlife by reducing flows, increasing water temperatures, lowering water levels and causing premature drying of vernal habitats.

11.3.1.4 Extremely low temperatures and/or extensive periods of unseasonably low temperatures during critical life history stages (e.g., hibernation, gestation/nesting) can alter animals' behaviors and decrease survivorship.

11.4 Storms and Flooding

11.4.1 Storms and flooding (Avg. Score: 1.00)

NJ Specific Threats: 11.4.1.1 Extreme storms and flooding events threaten aquatic and marine wildlife through habitat degradation and alteration, including alterations to off-shore or back-bay benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic and marine wildlife.

11.4.1.4 Flood events alter river or stream morphology, benthic conditions and habitat availability for wildlife, cause bank erosion, and deposit sediments in floodplain wetlands altering wildlife habitat.

11.4.2 Increased rainfall (Avg. Score: 1.00)

NJ Specific Threats: 11.4.2.1 Extreme rain events threaten aquatic wildlife through habitat degradation and alteration, including alterations to benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic wildlife.

11.4.2.2 Extreme rain events can damage wildlife nesting and resting habitats, including impacts to avian eggs and chick and small mammal survivorship.

11.6 Phenology Shifting or Alteration

11.6.2 Phenology shifts related to predator-prey ecology (Avg. Score: 1.00)

NJ Specific Threats: 11.6.2.1 Alters inter-specific relationships (e.g., competition, parasitism, predation) of wildlife, ultimately leads to detrimental impacts on the ecological system.

11.6.2.2 Shifts timing of species migration, breeding and hibernation, and available food resources, causes redistribution of species, or mortality for species that are unable to relocate due to their already isolated habitat or limited mobility.

11.6.3 Phenology shifts related to species redistribution (Avg. Score: 1.00)

NJ Specific Threats: 11.6.3.1 Shifts in timing of species migration, breeding and hibernation, and available food resources, as a result of wildlife range shifts driven by climate change.

11.6.3.2 Shifts in nesting times or egg incubation durations can limit nest success and longterm populations.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 2.00)

NJ Specific Threats: 12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.2 Lack of up-to-date existing information (Avg. Score: 2.00)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.3 Need to answer research question (Avg. Score: 2.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.4 Need to develop new technique (Avg. Score: 1.00)

NJ Specific Threats: 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 1.00)

NJ Specific Threats: 12.3.0.1 Regulatory habitat protections within state land use regulations are spatially limited to specific geographic areas (e.g., Pinelands, Coastal Area) or geographic features (e.g., wetlands, streams) and so fail to protect critical habitats that exist outside of these regulated areas.

12.3.0.3 Lack of a licensing program and standards for NJ Nuisance Wildlife Control Operators (NWCOs) leads to inadequate controls over handling of wildlife and lack of reporting of non-game/SGCN species (and all wildlife) encountered in nuisance situations.

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 1.00)

NJ Specific Threats:

12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 2.00)

NJ Specific Threats:

14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 2.00)

NJ Specific Threats:

14.2.1.1 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various forest management practices.

14.2.1.2 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various aquatic and riparian management practices.

14.2.1.5 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various wetland management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 1.00)

NJ Specific Threats:

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.5 Secure and promote the protection/restoration of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through incentive programs.

1.2.1.6 Secure and promote the protection/restoration of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers through incentive programs.

1.2.1.7 Secure and promote the protection/restoration of fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.12 Create incentives (non-monetary and/or monetary) for land developers to redevelop abandoned areas (e.g., shopping centers, office complexes) to minimize the loss of natural habitats and reduce the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.18 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and land managers to control and reduce the impacts of invasive, native and non-native species in order to increase structural habitat diversity.

1.2.1.19 Create incentives for federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to farmers, woodland landowners, and private landowners to adopt and/or endorse consistent BMPs concerning controlled burns to maintain and/or improve wildlife habitat.

1.2.1.20 Coordinate across government agencies and non-government organizations to create or expand upon tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMP's.

1.2.1.22 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to horse/livestock farm owners and managers to increase structural habitat diversity in and around the farms by managing vegetation for a variety of species, in particular, farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

1.2.1.23 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to provide cost shares and/or plan approvals for management based on management approaches and prescriptions.

1.2.1.25 Create incentives (non-monetary and/or monetary) within State regulations to assist and programs to deliver those incentives to aquaculture growers to relocate, for example, from intertidal to subtidal lease areas through buyouts of leases or microloans, and/or promoting on-lease conservation measures used by aquaculture growers (such as the implementation of conservation easements, use of living shorelines, incorporation of BMPs for habitat protection, etc.) for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

1.2.1.28 Create incentives to implement dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

2 Direct Management of Natural Resources

2.2 Dam and barrier removal

2.2.1 Culvert work

2.2.1.1 Replace existing barriers to wildlife movement with and/or install appropriately-sized systems to accommodate wildlife dispersal.

2.3 Fire management

2.3.3 Prescribed burning

2.3.3.1 Evaluate different management techniques of prescribed burns that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

2.3.3.2 Conduct prescribed burning in Northern New Jersey forests to maintain and regenerate a mosaic of upland forest habitats.

2.3.3.3 Conduct prescribed burning to improve wildlife habitat.

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.5 Implement biologically safe and appropriate control/management strategies, and where appropriate, eradication strategies to reduce the impacts and/or limit the distribution of invasive and/or non-native plant species within or near aquatic systems using methods that will provide the most protection to the aquatic and riparian ecological system, and minimize disturbance to the soil and wildlife. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.8.0.6 Implement long-term management of invasive and/or non-native plants to help maintain functioning ecological systems and biological diversity, and to enhance travel corridors. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.4 Restore and/or enhance suitable travel corridors connecting conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.8 Protect significant natural and/or unique communities by implementing best management practices when conducting habitat restoration strategies.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.12 Create and/or maintain scrub-shrub habitats through revegetation efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.15 Restore and/or enhance terrestrial and aquatic habitats proximate to but not adjacent to roads and other transportation corridors for terrestrial-bound SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.10.0.18 Implement a habitat improvement and restoration program to restore cold-water fish habitat, ecosystems and populations.

2.10.0.21 Restore and/or enhance understory habitats that suppress invasive species and provide critical resources and enhance sheltering, foraging, and nesting cover for wildlife.

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.10.0.24 Use NJ's CHANJ mapping and guidance to establish vegetation and enhance or create corridors between fragmented habitats with similar vegetation, slope, soils, structure, etc. to ensure vegetative integrity is maintained to allow wildlife to safely disperse, and corridors are buffered with natural habitats to minimize disturbance to wildlife within the corridors.

2.10.0.25 Enhance SGCN fish habitats through aquatic and riparian vegetation restoration.

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.11.0.3 Create suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats through vegetation management.

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through vegetation management.

2.11.0.6 Reclaim degraded rare species habitats by conducting vegetation management needed to restore habitat value for the documented/target SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.8 Maintain, enhance and/or restore biologically appropriate buffers for SGCN-inhabited/used freshwater wetlands through vegetation management.

2.11.0.13 Implement best management practices (BMPs), protective strategies, and guidelines for vegetation management to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.11.0.14 Conduct vegetation management adjacent to roads for SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.11.0.16 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.11.0.20 Create and/or maintain scrub-shrub habitats through management efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.11.0.21 Minimize the degradation, alteration and/or changes in hydrology of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and subsequent disturbances to and behavioral changes of wildlife by maintaining or enhancing these areas and biologically appropriate buffers through habitat management and/or revegetation or restoration efforts.

2.11.0.23 Implement appropriate habitat management actions in areas where natural disturbances, such as wildfire, have been precluded.

2.11.0.24 Conduct vegetation management adjacent to aquatic habitats following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.25 Conduct vegetation management along access roads following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.26 Conduct vegetation management along roadsides and medians, avoiding peak activity periods for wildlife, that enhances wildlife dispersal naturally and safely across roads and similar barriers to/between terrestrial and/or aquatic habitats.

2.11.0.27 Conduct vegetation management for target shrub- or young forest-dependent SGCN following BMPs to minimize the risk of the establishment of invasive and non-native plants.

2.11.0.28 Conduct vegetation management in agricultural areas following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.29 Conduct vegetation management on transportation and service corridors (i.e., rights-of-way) following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.31 In areas where vegetative communities are shifting due to fire suppression and controlled burns are not feasible, manage vegetation to improve wildlife habitat.

2.11.0.32 Increase structural habitat diversity around and when feasible, within agricultural landscapes by managing vegetation for a variety of species, in particular, those farms that have removed scrub-shrub habitat and/or fragmented forests, and by implementing ecologically best practices (e.g., no-till farming, maintaining hedgerows, buffer set-asides, etc.).

2.11.0.33 Increase structural habitat diversity by implementing long-term vegetation management to minimize the potential for the establishment of invasive and/or non-native plants that may outcompete native vegetation.

2.11.0.34 Increase structural habitat diversity by managing residential, commercial and recreational areas' landscapes for a variety of species. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.35 Increase structural habitat diversity by managing vegetation adjacent to aquatic habitats in a manner that provides a buffer from runoff and erosion and a microclimate to stabilize seasonal temperatures to benefit a variety of aquatic and semi-aquatic species.

2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.

2.11.0.37 Increase structural habitat diversity by minimizing the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats which benefits wildlife.

2.11.0.38 Increase structural habitat diversity in and around horse/livestock farms by managing vegetation for a variety of species, in particular, in and around farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

2.11.0.39 Increase structural habitat diversity in and around solar farms by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.40 Increase structural habitat diversity surrounding areas used for energy, mining, and transportation and service corridors by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides, and avoid managing habitat during the breeding seasons for ground-nesting birds, reptiles, amphibians and small mammals.

2.11.0.41 Increase structural habitat diversity through the implementation of a variety of vegetation management practices such a prescribed burns (either increasing or decreasing their frequency depending on the site and objective), plantings, etc. that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.42 Increase structural habitat diversity within wind farms for terrestrial bound and low-flying species and around wind farms for other wildlife by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.43 Manage forests to increase variation in age structure and composition using BMPs that promote and maintain functioning ecological forest-based systems and biological diversity.

2.11.0.45 Regularly and/or rotationally create young forest habitat in targeted areas to maintain and regenerate a mosaic of upland forest habitats that will benefit shrub- and young forest-dependent species.

2.12 Water management

2.12.3 Drainage

2.12.3.2 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) such as removing drainage ditches to restore natural stream flows and wetlands, that benefit wildlife inhabiting these areas.

2.12.3.3 Remove tile drains and drainage ditches to improve wetland hydrology and restore natural stream flows during appropriate times to avoid sensitive periods (e.g., nesting, denning, roosting) and minimizes harm to wildlife, particularly SGCN.

2.12.3.4 Expand the acreages and enhance the effective size of SGCN habitats by reclaiming/restoring adjacent, degraded habitats by removing tile drains and drainage ditches.

2.12.3.5 Remove drainage ditches adjacent to roads to decrease the attraction for amphibians, reptiles and small mammals, and thereby minimizing road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.12.3.6 Protect significant natural and/or unique communities by and when removing tile drains and drainage ditches.

2.12.3.11 Implement best management practices (BMPs), protective strategies, and guidelines when removing tile drains and drainage ditches to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.12.5 Spring development

2.12.5.1 Implement a habitat improvement and restoration program to restore cold-water fish habitat, ecosystems and populations.

2.13 Wildlife damage management

2.13.0 Nuisance fish and wildlife damage

2.13.0.5 Investigate the impacts of human-subsidized and/or naturally occurring predator species on SGCN to assess the need for integrated wildlife damage management techniques (e.g., predator exclosures, fish blockages, electric fence, culls) and/or policy changes on state land management that minimize the impacts of human-subsidized predators.

2.13.0.8 Implement and assess management strategies to control and reduce the impacts of detrimental species and diseases that pose threats to native wildlife or communities.

2.14 Wildlife disease management

2.14.0 Wildlife disease strategy development and investigation

2.14.0.1 Investigate diseases/pathogens impacting SGCN and/or their habitats.

2.14.0.2 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

2.14.0.3 Protect SGCN from exotic pathogen introduction or incident through implementation of a "rapid response plan"; DFW to give priority attention to these species in planning and/or implementing a response.

2.14.0.4 Conduct long-term monitoring of diseases in vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts.

2.14.0.5 Assess the impacts of diseases on the life cycles of wildlife.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.6 Conduct long-term studies on resident and migratory SGCN to determine if there are changes to the populations' demography (productivity, survival, dispersal) and/or to their critical and/or supporting habitats (i.e., diminishing in value, acreage or connectivity, etc.), in particular changes that would not maintain SGCN at viable levels for species populations. Update data and GIS maps; provide updated information to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.9 Identify SGCN (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources, and compile/collect and evaluate data/information regarding potential management strategies to improve the availability of such SGCN's food resources.

3.0.0.10 Conduct long-term studies to evaluate the effectiveness of management strategies implemented to enhance food/prey availability for SGCN [whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources] through studies that investigate the populations and health of the food resources as well as the target SGCN. Revise management strategies as needed and continue to monitor the effectiveness of the efforts.

3.0.0.11 Develop, implement and evaluate the effectiveness of town plans that avoid impacts to SGCN species and their habitats.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.14 Identify areas with invasive, aquatic plants and animals and collect a detailed baseline assessment of the species' status and distribution. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort. Researchers and contractors performing Forest Stewardship Inventories and/or Plans on state lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.0.0.19 Identify the presence and status (e.g., functioning, structure, slated for removal, etc.) of existing dams and culverts within and/or that may impact SGCN and their habitats, and create a database that includes a GIS component identifying the locations of such structures and their status. Share this information with appropriate organizations and/or agencies evaluating the benefits and risks of such structures on SGCN and their habitats.

3.0.0.20 Once baseline data identifying and describing the status of existing dams and culverts have been gathered, conduct evaluations at a variety of sites to determine whether the benefits of culvert and dam creation or removal outweigh the risks to SGCN species and their habitats, and if other variables/conditions specific to individual sites/locations result in a different outcome. Identify and target appropriate dams and culverts for removal and/or reconstruction to minimize harm to SGCN species and their habitats.

3.0.0.22 Develop, implement and evaluate the success of a habitat improvement and restoration program to restore cold-water fish habitat, ecosystems and populations.

3.0.0.23 Identify (through wildlife and aquatic system surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and research water quality parameters for all [types of] aquatic systems for various SGCN populations.

3.0.0.24 Identify (through aerial and topographic maps), and confirm through field surveys, potential vernal pools using standard protocols. Provide confirmed vernal pool locations (and when possible, a description of the pools condition) and species' presence data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.26 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species including objectives and guidance pertaining to and the condition/status of critical and supporting habitats.

3.0.0.27 Evaluate the effectiveness of strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals through research and monitoring. Develop and provide NJ DEP and other appropriate governing agencies/commissions a summary of findings and recommendations to improve such efforts.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.2 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.0.3 Survey for and monitor populations of freshwater aquatic focal SGCN to assess the populations' demography, trends, condition, distribution, etc.

3.2.0.4 Conduct long-term monitoring of the impacts of contaminants to vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.2.0.5 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

3.2.0.6 Develop, implement and conduct studies to evaluate the effectiveness of methods implemented to reduce road mortality of wildlife (e.g. wildlife underpasses, road closures).

3.2.0.7 Track (via a database that includes a GIS component) and research problematic species and diseases to determine their distribution, impacts on SGCN wildlife/wildlife communities, and develop potential control measures.

3.2.0.8 Implement and conduct long-term monitoring of control measures aimed at minimizing the impacts of problematic species and/or diseases to evaluate the effectiveness of such efforts and to identify and incorporate additional strategies as appropriate.

3.2.0.10 Evaluate the effectiveness of sanitation/decontamination protocols in minimizing the transference of wildlife diseases and invasive plant species.

3.2.0.11 Investigate the impacts of ORV use as a mechanism to spread wildlife diseases and invasive plant species to native wildlife and habitats. Integrate this information when mapping undeveloped roads and trails to identify potentially sensitive areas in northern NJ forests.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.2 Age, size and sex structure

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.3 Baseline inventory

3.2.3.6 Investigate the feasibility and potential for success of conducting genetic rescue through translocation and/or reintroduction of animals into suitable habitat that was historically occupied to increase genetic diversity and reconnect isolated populations. Methods of investigation should include, but are not limited to, thorough literature reviews, expert opinions, identifying potential pitfalls (e.g., species' fidelity to their range or critical areas), and an examination of historic and current SGCN population distribution and suitable habitat availability.

3.2.3.7 Identify roads or portions of roads, paved or unimproved (through site surveys, land use/land cover assessments and analyses, review of available data, enlistment of species experts, etc.) with high incidences of road mortality and/or presence of snakes, turtles, medium-sized and large mammals. Conduct assessments of the roads and incorporate information into a database that includes descriptions (e.g., qualifiers to help prioritize the roads' risk to wildlife) and a GIS component of the locations of such areas. Share this information with appropriate organizations and/or agencies working to implement measures (e.g., wildlife passages, road closures) to minimize the risk to these species.

3.2.3.9 Investigate hazardous environmental issues that may impact grassland invertebrates.

3.2.5 Genetics

3.2.5.1 Investigate the feasibility and potential for success of conducting genetic rescue through translocation and/or reintroduction of animals into suitable habitat that was historically occupied to increase genetic diversity and reconnect isolated populations. Methods of investigation should include, but are not limited to, thorough literature reviews, expert opinions, identifying potential pitfalls (e.g., species' fidelity to their range or critical areas), and an examination of historic and current SGCN population distribution and suitable habitat availability.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.6 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) that could, through revegetation and/or enhancement efforts, become suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN.

3.3.1.7 Map and prioritize existing and potential areas for early succession forest management. Share the results with state, county and municipal planners.

3.3.1.8 Assess the availability and suitability of forest habitats for SGCN species (particularly reptiles and amphibians, birds, pollinators, and tiger beetles) in southern forests since Superstorm Sandy.

3.3.1.17 Identify and map undeveloped roads and trails in all conserved forests, and create a database of locations. Integrate information regarding potentially sensitive areas.

3.3.1.18 Conduct an assessment using available data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels.

3.3.1.19 Identify and codify legal ORV access areas on state (and if appropriate, other conserved) lands. Provide GIS mapping to the landowner for potential use in directing such recreational activities.

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.2 Monitoring

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.4 Protect water quality and aquatic-dependent species by appropriately designating Category 1 waters and enforcing protective regulations. Seek appropriate classifications for stream segments based on Endangered and Threatened Status and/or the Index of Biotic Integrity (IBI) results that do not fulfill Category One requirements.

3.3.2.5 Conduct long-term monitoring of water quality of SGCN aquatic habitats (and aquatic systems feeding into those habitats) to evaluate protection and management efforts to reduce, if not eliminate, chemical contamination, siltation, eutrophication, and other forms of pollution/contamination of aquatic systems.

3.3.2.9 Investigate the effectiveness of various silviculture techniques for enhancing forests for forest-dependent SGCN.

3.3.2.10 Evaluate the efficacy and success of different management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.3.2.12 Evaluate and compare the effectiveness of different management techniques (e.g., prescribed burning, mowing, brush-hogging, etc.) for maintaining suitable habitat for grassland-dependent species and species dependent upon early successional habitats.

3.3.2.13 Evaluate the effectiveness of management strategies (e.g., timing restrictions for mowing, cooperative agreements with utility companies for maintenance of rights-of-ways) that maintain and enhance large existing areas of grassland in perpetuity. Focus on habitat patches that can be managed to enhance the total size of suitable grassland habitat and create interspersed early-successional habitat.

3.3.2.14 Research and evaluate the effectiveness of water quality management practices on water-dependent and semi-dependent SGCN, particularly those practices associated with permitting or mitigation actions.

3.3.2.15 Investigate the effectiveness of management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.3 Develop/improve management techniques that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.8 Develop best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5.3.9 Develop strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

3.5.3.10 Develop a habitat improvement and restoration program to restore cold-water fish habitat.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.14 Develop aquaculture practices in the coastal areas that are compatible with the recovery of SGCN.

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.3.16 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.3.20 Develop guidance on various silviculture techniques for enhancing forests for forest-dependent SGCN.

3.5.3.21 Develop management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.22 Identify (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) and modify management strategies (e.g., timing restrictions for mowing, cooperative agreements with utility companies for maintenance of rights-of-ways), based on research, that maintain and enhance large existing areas of grassland in perpetuity.

3.5.3.23 Revise water quality management practices based on research on water-dependent and semi-dependent SGCN, particularly when associated with permitting or mitigation actions.

3.5.3.24 Based on research, modify management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.1 Develop studies to evaluate management strategies to improve the availability of prey/food resources for SGCN whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources. Monitor and investigate the management strategies over time to determine success and/or the need to revise methods.

3.5.4.2 Develop, implement, monitor and evaluate management strategies to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

3.5.4.5 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

3.5.4.7 Investigate the feasibility and potential for success of conducting genetic rescue through translocation and/or reintroduction of animals into suitable habitat that was historically occupied to increase genetic diversity and reconnect isolated populations. Methods of investigation should include, but are not limited to, thorough literature reviews, expert opinions, identifying potential pitfalls (e.g., species' fidelity to their range or critical areas), and an examination of historic and current SGCN population distribution and suitable habitat availability.

3.5.4.8 Develop a habitat improvement and restoration program to restore cold-water fish ecosystems and populations.

3.5.4.9 Conduct studies to evaluate the impacts of roads on SGCN and develop, implement and conduct studies to evaluate the effectiveness of methods to reduce road mortality of wildlife (e.g. wildlife underpasses, road closures).

3.5.4.13 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.17 Investigate new, non-invasive techniques for SGCN population evaluation through literature review, expert opinion, trial studies (if low risk), etc.

3.5.4.18 Investigate the effectiveness of survey techniques through selected “ground truthing” and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

3.5.4.21 Develop BMPs to address problematic species and diseases of unknown origin.

3.5.4.22 Investigate the efficacy of implementing strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities.

5 Facilities and Areas

5.15 Wildlife Management Areas

5.15.6 Roads

5.15.6.1 Clearly post areas/roads where vehicle access is permitted.

5.15.6.2 Clearly post areas/trails where vehicle access is not permitted.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.3 Secure and protect riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.4 Secure and protect fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.7 Secure and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.8 Secure and protect scrub-shrub habitats for SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.3 Increase the protection of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through conservation area designations.

6.3.0.4 Promote the protection of fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through conservation area designations.

6.3.0.7 Promote the protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through conservation area designations.

6.3.0.8 Promote the protection of scrub-shrub habitats for SGCN through conservation area designations.

6.4 Private lands agreements

6.4.0 Private land agreement strategies

6.4.0.1 Enter into private lands agreements to expand control burns on private lands, in particular those adjacent to conserved lands to improve SGCN habitats.

7 Law Enforcement

7.1 Law enforcement

7.1.3 Sub-national Level

7.1.3.2 Increase the number of law enforcement officers tending to wildlife issues to a reasonable number to sufficiently cover the State and marine waters.

7.1.4 Scale Unspecified

7.1.4.1 Improve enforcement of policies and/or regulations that promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

7.1.4.3 Increase law enforcement presence proximate to sensitive areas [e.g., avian nesting sites, in particular rookeries, and reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively)] to deter human activity and subsequent disturbance to SGCN.

7.1.4.6 Recruit law enforcement to assist in the protection and enhancement of SGCN populations, in particular endangered species, through improved awareness of species through trainings, partnerships, and other methods. Information should include but is not limited to: 1) Issues concerning illegal collection of reptiles, 2) Persecution of rare snakes, 3) Illegal recreational activities on public lands (e.g., off-road vehicles) and their impact on wildlife, 4) Identification of sensitive areas, critical sites and/or "hot-spots" for collection.

7.1.4.7 Increase law enforcement presence to enforce regulations governing recreational activities (e.g., the use of personal watercraft and off road vehicles, caving, rock climbing, etc.) on conserved lands and within other sensitive habitats, and discourage activities that cause harm or disturbance to vegetation, wetlands, fish and wildlife.

7.1.4.9 Implement policies that improve and secure habitat connections between conserved SGCN habitats.

7.1.4.10 Implement policies that promotes expanding acreages and enhances the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.13 Implement policies that protect vernal pool habitats to benefit SGCN that rely upon them and promotes connectivity of SGCN populations.

7.1.4.15 Implement policies that preserve and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

7.1.4.16 Implement policies that protect and restore riparian areas.

7.1.4.17 Improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

7.1.4.19 Implement policies that protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

7.1.4.23 Implement policies that minimize wildlife road mortality.

7.1.4.26 Educate law enforcement personnel that there may be unauthorized research projects taking place and to encourage them to investigate any activities that appear to be harmful to wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.2 Develop a team of personnel from government entities, conservation organizations and other stakeholders engaged in oil/gas spill response for marine and freshwater habitats to develop a feasible plan for oil spill response and/or to amend NJ's current oil spill response plan that clearly outlines each organizations responsibilities and an assessment and location list of available equipment for boom deployment during oil spills.

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.1.0.4 Engage government agencies, conservation partners and other stakeholders in constructive dialogues encouraging them to influence policy change and the creation of incentives through a habitat bill and/or municipal ordinances for backyard habitat.

8.1.0.6 Engage government agencies, conservation partners and other stakeholders in discussions focused on sharing information regarding coastal and marine critical wildlife habitats, developing comprehensive mapping to assist in reducing impacts of energy production activities, and establishing a long-term monitoring program to update the data. Ensure this information is available to appropriate personnel for planning or response measures.

8.1.0.11 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting sportsmen's organizations and fisheries, as well as public constituents, addressing the unintended effects abandoned fishing gear, tackle and crab pots can have on wildlife, and promote the collection and/or reporting of abandoned items and their locations.

8.1.0.12 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting sportsmen's organizations and fisheries, as well as public constituents, addressing the unintended effects fishing gear and tackle can have on wildlife.

8.1.0.13 Engage DOD in a constructive dialogue regarding strategies to minimize disturbances to all SGCN (i.e., beyond their federal requirements) from forest management and other practices on their lands.

8.1.0.14 Engage DOD in a constructive dialogue regarding strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities.

8.1.0.15 Engage government agencies, conservation partners and other stakeholders in discussions encouraging and supporting the creation of laws and policies requiring vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

8.1.0.16 Engage local governments in discussions regarding the importance of them adopting/passing ordinances which require assessing and addressing secondary impacts (i.e., ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

8.1.0.17 Engage municipalities in constructive dialogue to identify and minimize destruction of areas prioritized for early succession forest management.

8.1.0.18 Engage NJDOT, NJ Transit Authority and other road management entities, wildlife conservation organizations/agencies (e.g., Division of Fish and Wildlife, New Jersey Conservation Foundation, Conserve Wildlife Foundation of NJ), and communities and citizens in discussions regarding the importance of and methods to enhance habitat connectivity, and work together to develop feasible strategies for ensuring that wildlife can disperse naturally and safely across roads and similar barriers to terrestrial and/or aquatic habitats.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.21 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation human-subsidized and/or overabundant, native species cause to local nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.22 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation invasive species cause to native nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.26 Coordinate across federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to woodland landowners to adopt or endorse consistent best management practices concerning controlled burns to maintain and/or improve forested habitat for wildlife.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.32 Work with NJ DEP's Water Management, other state agencies and watershed organizations to determine if mitigation is warranted at applicable power plants.

8.1.0.33 Engage government agencies, conservation partners and other land managers, communities, landowners, and commercial and industrial stakeholders in discussions regarding the importance of protecting and methods to protect priority wetlands beyond the levels afforded through regulation by maintaining and/or restoring optimal biological buffers around wetlands.

8.1.0.34 Work with the NJ Education Association and Department of Education to design curriculum and outdoor experimental learning opportunities, and provide training to teachers on implementation of these activities.

8.1.0.37 Enlist landowners and NJ citizens in the protection of and survey efforts for SGCN, in particular rare species, by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management and wildlife-related volunteer programs.

8.1.0.38 Engage partners, stakeholders and land managers in constructive dialogue promoting forest stewardship for SGCN that use core forests and forested corridors.

8.1.0.40 Encourage researchers, land managers, naturalists and enthusiasts to follow proper procedures for the coordination and/or permitting of research/management activities involving wildlife and sensitive habitats, and discourage activities that alter vegetation or wetlands, or cause harm or disturbance to wildlife.

8.1.0.42 Engage citizens, wildlife observers and photographers through discussions and distributable information regarding the importance of and encouraging implementing responsible and ethical behavior when observing wildlife by developing an alliance of wildlife photographers and widely circulating recommendations on how to reduce impact.

8.1.0.44 Engage conservation partners, stakeholders, government agencies and other land stewards in constructive dialogues encouraging their inclusion of controlled burns in forest and other stewardship plans.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.4 Utilize WSFR grant funds, in combination with alternate funding sources as needed, to implement an extensive educational/outreach program consisting of displays, fliers, list-serve mailings, Facebook posts and speaking engagements with sportsmen's organizations and fisheries addressing the unintended effects abandoned fishing gear, tackle and crab pots can have on wildlife.

8.3.0.7 Develop and provide (or otherwise make publicly available) educational programs and/or materials that describe the negative impacts of off-road vehicles and watercraft use in and adjacent to critical SGCN habitats, and the importance of confining such activities to more appropriate locations and/or seasons.

8.3.0.8 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate recreationists and encourage landowners to eliminate garbage in the vicinity of suitable wildlife habitat, in particular SGCN habitat. Information should include the detrimental impacts garbage may have on various wildlife species.

8.3.0.9 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners and land managers to include only native plants in landscaping and restoration projects. Provide information to assist them in detecting problematic establishment of invasive, non-indigenous plants.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.14 Develop an educational outreach program using a variety of media to ensure maximizing the distribution of information, in particular targeting sportsmen's organizations and fisheries, regarding the unintended effects abandoned fishing gear, tackle and crab pots can have on wildlife, including non-target species.

8.3.0.15 Develop an educational outreach program for citizens regarding: 1) The impacts to wildlife as a result of plastic bags entering aquatic and marine systems, 2) The importance of decreasing the amount of plastic shopping bags in circulation, 3) The need for businesses to voluntarily charge for bags or reimburse people for using their own non-plastic bags, and 4) The need for their assistance through public pressure on legislators and government to pass legislation that that limits the amount of plastic shopping bags in circulation.

8.3.0.19 Develop an educational outreach program for the public on the devastating effects predators can have on native nesting wildlife.

8.3.0.24 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

8.3.0.25 Develop educational outreach programs for landowners, nurseries and the general public regarding the negative impacts of invasive and non-native plants on our natural communities.

8.3.0.26 Develop educational outreach programs for private and public landowners and land managers regarding the importance of and how to manage core forests and forested corridors in a way that will be beneficial for SGCN, particularly endangered, threatened and special concern species.

8.3.0.27 Develop educational outreach programs for public and private landowners and land managers regarding the importance of structural habitat diversity, methods to increase diversity, and/or incentive programs available to increase habitat diversity.

8.3.0.28 Develop educational outreach programs for public and private landowners and land managers regarding the importance of managing grasslands for grassland-dependent species, methods of management, and/or incentive programs available.

8.3.0.29 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about the importance of maintaining a vegetative buffer along riparian and aquatic habitats to intercept storm water runoff and minimize soil erosion.

8.3.0.30 Develop educational outreach programs for private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.5 Develop a plan that directs the creation or expansion of energy or utility rights-of-way in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.6 Develop a plan that directs the creation or expansion of roads and railroads or the re-establishment of abandoned railroads within and adjacent to critical forested habitats in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.7 Develop a plan that directs the maintenance of or new channelization of forested streams and rivers in a manner that minimizes impacts of the aquatic ecological system and adjacent forest

9.1.0.8 Develop a plan that focuses on strategies for oil pipelines to avoid sensitive habitats that would be highly impacted by oil spills.

9.1.0.9 Develop a plan that focuses on strategies to minimize the creation of renewable energy farms (e.g., solar, wind) and related infrastructures within and their impacts on forested habitats and the wildlife community.

9.1.0.10 Develop a plan that focuses on strategies to minimize the impacts of mining on critical forested habitats.

9.1.0.11 Develop a plan that focuses on strategies to minimize the impacts of power plants on critical forested habitats and the wildlife community.

9.1.0.13 Develop a plan to minimize agriculture that would result in groundwater withdrawal in critical forested areas.

9.1.0.14 Develop a plan to minimize development that would result in groundwater withdrawal in critical forested areas.

9.1.0.15 Develop a plan to minimize fragmentation of terrestrial and aquatic habitats by roads.

9.1.0.16 Develop a plan to minimize new lawnscapes and preserve natural vegetation within and adjacent to critical forest areas.

9.1.0.17 Develop a plan to minimize nutrient and effluent loads from aquaculture practices.

9.1.0.18 Develop a plan to minimize the effects of road widening and traffic volume increases within critical wildlife habitat areas using CHANJ products.

9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

9.1.0.20 Develop a plan to minimize the impacts of existing agricultural properties adjacent to and the conversion of forest habitats (terrestrial and aquatic, within or adjacent to critical forests) to agriculture, grazing areas/livestock farms, and plantations.

9.1.0.21 Develop a plan to minimize the use of any-sized dam in critical forested areas.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.23 Develop a plan to mitigate the effects of transportation barriers by using CHANJ products.

9.1.0.24 Develop a plan to prevent livestock from entering water bodies in critical forested habitats.

9.1.0.25 Develop a plan to prevent the conversion of forested stream buffers to pastures in critical forested habitats.

9.1.0.27 Develop a plan to use wildlife-appropriate culverts in critical forested areas.

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.31 Develop wetland restoration plans that consider the life history and needs of wildlife occupying targeted habitats.

9.1.0.32 Incorporate aquatic habitat connectivity and water quality/effluent standards into local and state aquaculture plans and BMPs.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.2 Organizational strategic and CMS planning

9.2.1 Organizational strategic and operational planning

9.2.1.1 Identify and codify legal ORV access areas on state lands.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.5 Develop response plans to address disease outbreaks within wildlife populations, in particular SGCN.

9.3.1.6 Amend NJ's current oil spill response plan to 1) expand the geographic area addressed, 2) expand the targeted species impacted and in need of recovery, and 3) revise current and integrate new actions into the plan as needed.

9.3.1.7 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.10 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.15 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.1.16 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.2 Listed species recovery planning

9.3.2.1 Develop proactive species recovery plans for all endangered and threatened species including guidance and objectives pertaining to critical and supporting habitat to meet and maintain recovery goals.

9.3.3 Habitat management planning

9.3.3.6 Develop a management plan for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

9.3.3.7 Develop a management plan to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

9.3.3.8 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.3.9 Develop a response plan to outbreaks using BMPs to control infestations and limit their spread in a way that avoids excessive harm to non-target species.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.16 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.21 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.3.22 Create management plans to minimize and/or prevent wildlife road mortality that will incorporate wildlife passages in conjunction with barrier fencing and, where possible, seasonal closures. Aquatic-associated passages must avoid disturbance to the natural streambeds and riparian habitat, permit high volumes of water to flow freely, and provide adequate travel corridors for terrestrial wildlife, while maintaining stream flow for fish passage. Bridges that span rivers and streambeds and include floodplain habitat on either side of the span to provide travel corridors for terrestrial wildlife are preferred over culverts.

9.3.3.24 Develop a plan to improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

9.3.3.26 Develop a management plan for parcels of suitable size to be managed for native herbaceous plant species that support breeding grassland dependent species.

9.3.3.27 Develop a management plan to expand breeding habitat and connectivity for tiger salamanders and other obligate vernal pool breeders.

9.3.3.28 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.3.29 Develop habitat management plans aimed at reducing or eliminating negative impacts of ORVs.

9.3.3.32 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3.34 Include controlled burn prescriptions in forest and stewardship plans to improve wildlife habitat.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.3 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.9 Review strategies for creating or enhancing connectivity (e.g., installing appropriately-sized wildlife passages) between wetlands to allow wildlife to disperse naturally and safely.

11.1.1.10 Use CHANJ mapping in reviews of proposed energy, mining, transportation and utility service companies/agencies' projects to attempt to maintain habitat connectivity and reduce fragmentation, and identify potential impacts of the projects.

11.1.1.11 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed offshore energy projects relating to drilling, extraction and distribution of petroleum and gas products to reduce habitat destruction and minimize impacts on wildlife.

11.1.1.12 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed solar farm projects to reduce habitat fragmentation and minimize impacts on wildlife.

11.1.1.13 Use the best available science (species data, habitat present, wind farm layout options, wind blade impacts on migratory species, location of migration routes, etc.) when conducting regulatory reviews of proposed wind farm projects to minimize impacts on migratory and resident wildlife and reduce habitat fragmentation.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.2.2 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.2.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into the environmental review process to help establish policies and plans that minimize the impact of aquaculture on fish and wildlife.

11.1.2.4 Review strategies for creating or enhancing connectivity (e.g., installing appropriately-sized wildlife passages) between wetlands to allow wildlife to disperse naturally and safely.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.2 Provide technical support to public and private landowners and land managers for controlling invasive, native and non-native plant species in order to increase structural habitat diversity.

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.7 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on the importance of maintaining habitat connectivity, minimizing fragmentation, and the use of CHANJ products to help them target areas for such planning.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.11 Provide educational resources, training programs, and on-the-ground guidance to private and public landowners and land managers on the benefits of and for creating young forest and early succession habitat for SGCN.

11.2.0.12 Provide educational resources and technical support to public landowners and land managers for managing grasslands for grassland-dependent species.

11.2.0.14 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters), and to enhance or restore biologically appropriate buffers.

11.2.0.15 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and landowners about the importance of retaining and in an effort to protect, create, enhance and/or restore vegetation along aquatic habitats.

11.2.0.16 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

11.2.0.17 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of vernal pools and the protection, enhancement and/or restoration of biologically appropriate buffers.

11.2.0.18 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats.

11.2.0.19 Provide educational resources and technical support to public and private landowners and land managers to promote the protection and/or enhancement of scrub-shrub habitats for SGCN.

11.2.0.22 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

11.2.0.23 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to SGCN habitats to promote the protection and/or enhancement of those adjacent habitats to increase the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and that connect conserved SGCN habitats.

11.2.0.24 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers on how to manage vegetated roadside areas (e.g., mowing, brush-hogging, etc.) on a schedule that avoids peak activity periods for wildlife and therefore, minimizes harm.

11.2.0.25 Provide educational resources, training programs, and on-the-ground guidance to resource managers regarding the assessment of and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) related to residential and commercial development.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.1 Engage partners and stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.3 Provide educational resources, training programs, and on-the-ground guidance to DOD to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop and implement forest management and other practices that minimize disturbances to SGCN (i.e., beyond their federal requirements).

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

11.2.2 With private landowners

11.2.2.1 Provide technical support to farming operations and woodland landowners on ways to decrease clean farming (edge-to-edge) practices and create ecotones to benefit bobwhite and other species dependent on early successional habitat.

100 Law and Policy

100. Legislation

100.1.3 Sub-national Level

100.1.3.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.3.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.4 County and Local

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.3 Expand the acreages and enhance the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN through local ordinances.

100.1.4.4 Secure wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and biologically appropriate buffers through local ordinances.

100.1.4.5 Secure SGCN-inhabited/used freshwater wetlands and biologically appropriate buffers through local ordinances.

100.1.4.7 Secure vernal pools and biologically appropriate buffers through local ordinances.

100.1.4.10 Secure critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through local ordinances.

100.1.4.11 Secure riparian areas through local ordinances.

100.1.4.12 Secure scrub-shrub habitats for SGCN through local ordinances.

100.1.4.13 Encourage municipal laws regulating domestic pets that may predate on wildlife.

100.1.4.14 Adopt/pass local ordinances which require assessing and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.5.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.5.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into state/local policy to minimize the impact of aquaculture on fish and wildlife.

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.1 Develop (and/or improve) policies and/or regulations that will promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

100.3.0.5 Develop policies that will promote improved and secure habitat connections between conserved SGCN habitats.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.10 Develop policies that promote protecting vernal pool habitats to benefit SGCN that rely upon them and promotes connectivity of SGCN populations.

100.3.0.12 Develop policies that promote the preservation and protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.13 Develop policies that will promote protecting and restoring riparian areas.

100.3.0.14 Develop policies and/or regulations that increase the protective buffers of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) to biologically appropriate distances to benefit SGCN that rely upon these habitats and improve the function of the [associated] aquatic systems.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.20 Develop policies and/or regulations that prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

100.3.0.21 Develop policies that minimize wildlife road mortality through: 1) Requiring the integration of wildlife passages into all new and repaired roads, in particular those areas that will connect SGCN habitats, 2) Requiring current fish/wildlife passages be improved and maintained in perpetuity, 3) Supporting seasonal road closures, in particular for unimproved roads, 4) Supporting projects that work to improve connectivity of SGCN habitats such as land conservation through acquisition or other means.

100.3.0.26 Adopt regulations requiring the combined sewer overflow alternative analyses required by regulation address potential impacts to wildlife in watercourses or receiving water bodies.

100.3.0.31 Create or expand tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMPs.

100.3.0.40 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.

100.3.0.42 Fully adopt the former Storm water Management Rules' 300ft buffer requirements into the Flood Hazard Area Control Act Rules.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.45 Increase the controlled burn season to focus on restoring vegetative communities.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.48 Propose new State law or regulation mandating that a State-level "development impact fee" be assessed on all new development approved by municipalities (via the Municipal Land Use Law processes), and dedicate such monies to the development and implementation of regional Habitat Conservation Plans (or existing plans/programs serving the same regional function).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.53 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded rights-of-way corridors associated with energy transport/transmission.

100.3.0.57 Develop regulations that when implemented will improve and secure habitat connections between conserved SGCN habitats.

100.3.0.58 Develop regulations that when implemented will promote the expansion of acreages and enhancement of the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.61 Develop regulations that when implemented will protect vernal pool habitats to benefit SGCN that rely upon them and promotes connectivity of SGCN populations.

100.3.0.63 Develop regulations that when implemented will preserve and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.64 Develop regulations that when implemented will protect and restore riparian areas.

100.3.0.65 Develop regulations that when implemented will protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

100.3.0.67 Develop regulations for lighting of/on tall structures that will minimize harm to and/or disorientation of wildlife, and enforce within state, county and local permitting processes.

100.3.0.68 Develop regulations that when implemented will prohibit the presence of managed cat colonies and trap, neuter and release programs in or near critical wildlife habitats.

100.3.0.69 Develop regulations that when implemented will minimize wildlife road mortality.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100.3.0.73 Develop regulations that would exempt the conversion of lawns to native vegetation (beneficial to wildlife) from local lawn ordinances.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.2 Create a policy that requires the NJ DEP to incorporate scientific information regarding climate change and sea level rise (e.g., predictions, habitat management/acquisition efforts to enhance resilience to inundation) on their websites and to work with other government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

100.4.0.3 Develop policies for mandatory buffer strips on preserved farmlands and state-owned agricultural lands.

100.4.0.4 Create a policy that requires the use of wildlife habitat and corridor mapping products for both regulatory use when conducting project reviews and planning/siting new or expanded rights-of-way projects.

100.4.0.8 Develop a white paper addressing the impacts that existing, new or expanded rights-of-way have upon wildlife, wildlife habitats and habitat connectivity.

100.4.0.9 Develop and implement policies to minimize the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats in order to benefit wildlife.

100.4.0.12 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.4.0.13 Develop policies for different circumstances (e.g., roadsides and medians, riparian, aquatic and terrestrial habitats) that outline appropriate habitat/vegetation management strategies and schedules to minimize risks to and benefit wildlife.

100.4.0.14 Develop policies to facilitate agreements between eligible entities to manage appropriate conserved lands for grassland-dependent species, and to have access to/obtain restoration funds.

100.4.0.16 Develop policies to implement habitat management strategies that will increase the structural diversity surrounding areas used for energy, mining, and transportation and service corridors which include but are not limited to the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-

100.4.0.17 Develop policies to implement habitat management strategies, including prescribed burns, that will increase the structural diversity on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies to control and reduce the impacts of invasive, non-native species in order to increase structural habitat diversity.

100.4.0.18 Develop policies to minimize the extent of infrastructure associated with energy and service corridors or areas (e.g., wind and solar farms, pipelines, utility lines) and that require the implementation of habitat management strategies that will increase the structural diversity in the area including (e.g., the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides).

100.4.0.19 Develop regulations that will minimize the creation of new barriers, remove or replace current barriers with appropriately-sized systems to accommodate wildlife dispersal, and to minimize road widening and traffic volume increases within critical wildlife habitat areas.

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.21 Ensure that Section 303(d) of the Clean Water Act and applicable State statutory/regulatory requirements for surface water pollutant budgets are being met by monitoring and enforcing regulatory Total Maximum Daily Load (TMDL) targets established within regional Water Quality Management Plans.

100.4.0.22 Work with NJ DEP's Division of Land Use Regulation to ensure protection of listed species and their habitats during stream cleaning events.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Fish

Anadromous & Semi-anadromous Fish

Focal species that comprise this Conservation Target:

Alewife | Atlantic Sturgeon | Blueback Herring
Shortnose Sturgeon

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 0.50)

NJ Specific Threats:
- 1.1.1.2 Loss, alteration and/or degradation of habitat.
- 1.1.1.5 Impervious surfaces can lead to a decrease in water recharge.
- 1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.
- 1.1.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 0.50)

NJ Specific Threats:
- 1.2.1.2 Loss, alteration and/or degradation of habitat.
- 1.2.1.5 Impervious surfaces can lead to a decrease in water recharge.
- 1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.
- 1.2.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 0.50)

NJ Specific Threats:
- 1.3.1.2 Loss, alteration and/or degradation of habitat.
- 1.3.1.4 Impervious surfaces can lead to a decrease in water recharge.
- 1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.
- 1.3.1.6 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

2 Agriculture and Aquaculture

2.3 Livestock Farming and Ranching

2.3.2 Small-holder Grazing (Avg. Score: 0.50)

NJ Specific Threats: 2.3.2.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.2.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

2.3.3 Agro-industry Grazing (Avg. Score: 0.50)

NJ Specific Threats: 2.3.3.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.3.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

2.4 Marine and Freshwater Aquaculture

2.4.2 Industrial Aquaculture (Avg. Score: 2.00)

NJ Specific Threats: 2.4.2.1 May degrade freshwater and intertidal habitat due to farming techniques and damage from associated structures.

2.4.2.2 Increased risk of parasite introduction into marine environments.

2.4.2.3 Potential for increased nutrient and effluent loads.

3 Energy Production and Mining

3.1 Oil and Gas Facilities and Pipelines

3.1.1 Distribution processes of petroleum and other liquid hydrocarbons (Avg. Score: 3.00)

NJ Specific Threats: 3.1.1.2 Loss, alteration and/or degradation of habitat.

3.1.1.3 Increased risk of oil spills.

3.1.1.4 Increased noise pollution.

3.1.1.5 Increased vehicular and ship traffic associated with construction and operations, and therefore an increased risk of wildlife mortality from strikes.

3.1.1.6 Increased risk of collision between marine mammals, sea turtles and fish and the marine-based structures/facilities.

3.1.2 Natural gas distribution processes (Avg. Score: 3.00)

NJ Specific Threats: 3.1.2.1 Fragments terrestrial and aquatic habitats.

3.1.2.2 Loss, alteration and/or degradation of habitat.

3.1.2.3 Increased risk of gas leaks and explosions.

3.1.2.4 Increased noise pollution.

3.1.2.6 Increased risk of collision between marine mammals, sea turtles and fish and the marine-based structures/facilities.

3.2 Mining and Quarrying

3.2.2 Surface Mining - Rock Quarry (and sand quarries) (Avg. Score: 1.75)

NJ Specific Threats: 3.2.2.1 Fragments terrestrial and aquatic habitats.

3.2.2.2 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

3.2.4 Sand Dredging (outside shipping lanes) (Avg. Score: 1.75)

NJ Specific Threats: 3.2.4.1 Loss, alteration and/or degradation of benthic marine habitats.

3.2.4.3 Potential for direct mortality of benthic organisms.

3.3 Renewable Energy

3.3.1 Wind Power (Avg. Score: 2.00)

NJ Specific Threats: 3.3.1.1 Turbines, blades, and structure foundations create a collision risk to volant species (birds, bats and invertebrates) and marine animals.

3.3.1.3 Loss, alteration and/or degradation of habitat.

3.3.1.4 Increased commercial infrastructure.

3.4 Conventional Power Plants

3.4.0 Conventional Power Plants (Avg. Score: 3.00)

NJ Specific Threats: 3.4.0.2 Loss, alteration and/or degradation of habitat due to new or the expansion of current facilities.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.3 Shipping Lanes

4.3.1 Movement of large ships in shipping lanes (Avg. Score: 2.50)

NJ Specific Threats: 4.3.1.1 Increased ship traffic increases the risk of wildlife mortality from strikes.

4.3.1.2 May disturb nesting and foraging of shoreline birds and aquatic animals, and/or alter migratory patterns of aquatic and marine wildlife.

4.3.2 Dredging impacts (Avg. Score: 2.00)

NJ Specific Threats: 4.3.2.1 Threatens wildlife by disrupting/removing stream bottom habitat.

4.3.2.3 Transportation of materials to and from disposal facilities may pose temporary disturbance to wildlife impacting foraging and nesting success.

5 Biological Resource Use

5.4 Fishing and Harvesting of Aquatic Resources

5.4.1 Intentional Use (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.4.1.3 Collection of fish for food, bait, or aquarium trade can lead to population exploitation.

5.4.1.4 Illegal collection of aquatic and semi-aquatic wildlife can have detrimental impacts on populations.

5.4.2 Intentional Use (large scale) (Avg. Score: 2.00)

NJ Specific Threats: 5.4.2.4 Illegal collection of aquatic and semi-aquatic wildlife can have detrimental impacts on populations.

5.4.3 Unintentional effects (subsistence/small scale) (Avg. Score: 3.00)

NJ Specific Threats: 5.4.3.1 Abandoned fishing tackle and gear, crab pots without excluders and ghost crab pots increase the risk of injury and death to marine mammals, sea turtles, sea birds, pinnipeds and fish species as well as terrestrial and semi-aquatic species as a result of consuming tackle or gear, entrapment and entanglement in gear.

5.4.3.2 Commercial/recreational shellfish dredging may impact marine ecosystems by uprooting submerged aquatic vegetation, disrupting substrates, increasing turbidity, and increasing predator species in localized areas.

5.4.3.4 Fish introduced for sport fishing can negatively impact native species by competing for resources and/or altering the habitat (e.g., disrupting benthic communities and/or severely impacting aquatic vegetation).

5.4.3.5 Trawling disrupts habitat and threatens marine species including benthic/bottom feeding fishes, invertebrates and other benthic organisms as it disrupts and homogenizes the substratum, can lead to species decline and reduced species diversity.

5.4.3.6 Fishing gear used by commercial fisheries results in bycatch or entanglement of non-targeted wildlife leading to injury and/or mortality.

5.4.3.7 Improperly sanitized equipment, relocation of fish, importation and release of non-native species, and the use of bait from a different location can spread invasive species and diseases from one waterbody to another.

5.4.3.8 Lead in fishing tackle is consumed by wildlife in the course of foraging and scavenging, causing injury and death.

5.4.4 Unintentional effects (large scale) (Avg. Score: 2.75)

NJ Specific Threats: 5.4.4.1 Fish introduced for sport fishing can negatively impact native species by competing for resources and/or altering the habitat (e.g., disrupting benthic communities and/or severely impacting aquatic vegetation).

5.4.4.4 Trawling disrupts habitat and threatens marine species including benthic/bottom feeding fishes, invertebrates and other benthic organisms as it disrupts and homogenizes the substratum, can lead to species decline and reduced species diversity.

5.4.4.5 Fishing gear used by commercial fisheries results in bycatch or entanglement of non-targeted wildlife leading to injury and/or mortality.

5.4.4.6 Overexploitation of riparian, estuarine, and marine fisheries may deplete food resources required by marine mammals, sea turtles, marine fish and piscivorous birds, in turn resulting lower reproduction and survival.

5.4.4.7 Improperly sanitized equipment, relocation of fish, use of bait from a different location, can spread invasive species and diseases from one waterbody to another.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.2 Boating (Avg. Score: 2.00)

NJ Specific Threats: 6.1.2.3 Motorized boat propellers can inflict physical harm aquatic wildlife species.

6.3 Work and Other Activities

6.3.1 Unauthorized research projects at significant habitats (Avg. Score: 1.00)

NJ Specific Threats: 6.3.1.4 Illegal transfer of freshwater fish from one waterbody/watershed to another can result in the spread of non-native, invasive and/or undesirable fish or mussel species and/or diseases.

6.3.2 Authorized research projects at significant habitats (Avg. Score: 2.50)

NJ Specific Threats: 6.3.2.1 Seismic air guns used during scientific marine research threatens spawning, feeding and breeding marine fishes in essential fish habitat areas off the NJ coast and may cause disturbance and physical harm to whales, dolphins, pinnipeds and sea turtles. Seismic surveys may also disturb marine mammals by disrupting navigation, foraging and communications ability.

6.3.2.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.2.3 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.3 Other "work" unrelated to research (Avg. Score: 3.00)

NJ Specific Threats: 6.3.3.1 Construction projects may disrupt normal wildlife behavior which can result in reduced reproductive success or survival, abandonment of critical sites, etc. (e.g., bridge-nesting birds).

6.3.3.4 Workers may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.3.5 Unauthorized manipulation of water level (for dam repair, dredging, aquatic vegetation control, etc.) particularly during spawning season or during the summer when temperatures are high and dissolved oxygen is low can have negative impacts on fish and fish habitat.

7 Natural Systems Modifications

7.2 Dams and Water Management/Use

7.2.1 Abstraction of Surface Water (domestic use) (Avg. Score: 2.00)

NJ Specific Threats:

7.2.1.1 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.1.2 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.1.3 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, and eliminates shallow water habitats.

7.2.1.4 Water intake systems associated with municipal water supply threaten aquatic organisms due to injury or mortality from impingement and/or entrainment.

7.2.2 Abstraction of Surface Water (commercial use) (Avg. Score: 3.00)

NJ Specific Threats:

7.2.2.1 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, eliminates shallow water habitats, and disrupts/removes stream bottom habitat.

7.2.2.2 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.2.3 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.2.4 Water intake systems associated with industrial use and power plants threaten aquatic organisms due to injury or mortality from impingement and/or entrainment.

7.2.3 Abstraction of Surface Water (agricultural use) (Avg. Score: 1.50)

NJ Specific Threats:

7.2.3.1 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.3.2 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, and eliminates shallow water habitats.

7.2.3.3 Impounding water to create or expand bogs for cranberry farming leads to the loss of natural wetlands and the alteration of the natural hydrology in the area.

7.2.3.4 Water intake systems associated with agriculture threaten aquatic organisms due to injury or mortality from impingement and/or entrainment.

7.2.3.5 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.5 Abstraction of Ground Water (domestic use) (Avg. Score: 2.00)

NJ Specific Threats:

7.2.5.1 Heavy withdrawal of ground water for domestic use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.6 Abstraction of Ground Water (commercial use) (Avg. Score: 3.00)

NJ Specific Threats: 7.2.6.1 Heavy withdrawal of ground water for industrial and commercial use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.7 Abstraction of Ground Water (agricultural use) (Avg. Score: 1.50)

NJ Specific Threats: 7.2.7.1 Heavy withdrawal of ground water for agricultural use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.9 Small Dams (Avg. Score: 2.50)

NJ Specific Threats: 7.2.9.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.9.2 Dams act as a barrier to fish movement, limiting the distribution of anadromous fish and fish that act as hosts for mussels.

7.2.9.3 Dams act as a barrier to movement, limiting the ability of aquatic or semi-aquatic wildlife to move safely between habitats.

7.2.10 Large Dams (Avg. Score: 2.50)

NJ Specific Threats: 7.2.10.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.10.2 Dams act as a barrier to fish movement, limiting the distribution of anadromous fish and fish that act as hosts for mussels.

7.2.10.3 Dams act as a barrier to movement, limiting the ability of aquatic or semi-aquatic wildlife to move safely between habitats.

7.2.11 Dams (size unknown) (Avg. Score: 2.50)

NJ Specific Threats: 7.2.11.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.11.2 Dams act as a barrier to fish movement, limiting the distribution of anadromous fish and fish that act as hosts for mussels.

7.2.11.3 Dams act as a barrier to movement, limiting the ability of aquatic or semi-aquatic wildlife to move safely between habitats.

7.2.12 Culverts (Avg. Score: 1.50)

NJ Specific Threats: 7.2.12.1 Improper design, placement, installation and maintenance of culverts and other stream crossing structures can impede or prevent the movements of terrestrial organisms and can restrict or limit stream flow, impeding the movement of aquatic organisms along riparian corridors.

7.2.13 Stream Burial (Avg. Score: 1.50)

NJ Specific Threats: 7.2.13.1 Eliminates riparian habitats.

7.2.13.2 Eliminates in-stream habitat and water resources for wildlife.

7.2.13.3 Alters the hydrology and quality of downstream aquatic and riparian habitats.

7.2.14 Tidal Water Management (Avg. Score: 1.00)

NJ Specific Threats: 7.2.14.1 Freshwater tidal management for flood control alters water levels and salinity in tidal wetlands.

7.2.14.2 Tidal water management for the purpose of managing for select species may alter existing hydrologic or vegetative conditions to the detriment of other species.

7.2.14.3 Open marsh water management (and other techniques) to control mosquito populations may alter existing hydrologic or vegetative conditions to the detriment of other species.

7.3 Other Ecosystem Modifications

7.3.1 Shoreline Stabilization (Avg. Score: 1.00)

NJ Specific Threats: 7.3.1.2 Efforts to stabilize stream corridors, particularly near roads and infrastructure, in which vegetated and dynamic shorelines are replaced with unvegetated and rigid structures such as rip-rap, gabion, concrete raceways and bulkheads interfere with fish spawning, nursery and foraging areas.

7.3.3 Removal of coarse woody debris (streams, forests, scrub-shrub habitats) (Avg. Score: 2.00)

NJ Specific Threats: 7.3.3.1 Decreases the available detritus that normally accumulates behind and within stream obstructions, minimizing or eliminating food sources and shelters for fishes, invertebrates and amphibians.

7.3.3.2 Decreases habitat and/or corridor suitability due to limited or absent shelter and foraging habitat.

7.3.3.4 Decreases available basking, shelter, and foraging habitats.

7.3.5 Poor habitat management (Avg. Score: 0.50)

NJ Specific Threats: 7.3.5.2 Shifting from natural vegetation to lawns can cause increased temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

7.3.5.4 Vegetation clearing or inappropriate alteration adjacent to aquatic habitats threatens aquatic species by degrading habitat and water quality (altering temperature and dissolved oxygen, increasing siltation and desiccation, etc.).

7.3.5.8 Storm water outfall pipes can create habitats in small streams that are conducive to non-native predatory fish which can negatively impact native fish species.

7.3.5.9 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, eliminates shallow water habitats, and disrupts/removes stream bottom habitat.

7.3.5.10 Ditching, draining and filling of marshes and wetlands eliminates habitat and degrades the remaining surrounding areas for wildlife.

7.3.5.11 Salt marsh water management to control mosquitoes may result in negative effects on other species (e.g., changing hydrology of low and high marsh).

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.

8.1.1.5 Invasive, non-native animals and plants increase the risk of introduction and transference of diseases

8.1.2 Invasive non-native aquatic animals (Avg. Score: 2.00)

NJ Specific Threats: 8.1.2.1 Parasites introduced into the marine environment can alter the reproductive and feeding behavior of native wildlife, leading to their decline.

8.1.2.2 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminishing habitat suitability and reducing ecological integrity of natural communities, and may introduce disease into a population.

8.1.6 Invasive non-native fungal/bacterial diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.1.6.1 The introduction of non-native fungal and bacterial diseases threatens native populations and ecosystems.

8.4 Problematic Species/Diseases of Unknown Origin

8.4.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.4.1.1 Non-native or poorly understood diseases and parasites could potentially impact native animals.

8.5 Viral/Prion-induced Diseases

8.5.1 Unspecified Species (Disease) (Avg. Score: 0.50)

NJ Specific Threats: 8.5.1.1 There is a large knowledge gap regarding the existence of, or potential for, other diseases impacting native wildlife.

8.5.2 Named Species (Disease) (Avg. Score: 1.00)

NJ Specific Threats: 8.5.2.1 Diseases such as West Nile Virus, arenavirus, sudden oak death, Avian Influenza, and snake fungal disease cause morbidity or mortality to native populations.

8.5.2.2 Viral Hemorrhagic Septicemia (VHS) (recently introduced into the Great Lakes) has caused mortality in 30 common fish species across many families. Although many of the fish SGCN have not been tested, it is hypothesized that they may be vulnerable. If introduced into NJ, VHS is predicted to cause widespread fish kills.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.1 Domestic and Urban Waste Water

9.1.1 Sewage (Avg. Score: 2.00)

NJ Specific Threats: 9.1.1.1 Degradation of aquatic and marine water quality and habitats by changing turbidity, flow and water chemistry.

9.1.1.2 Leads to increased eutrophication and algae blooms that result in oxygen depletion.

9.1.1.3 Contaminants in sewage treatment effluents and Combined Sewer Overflows can cause developmental and behavioral abnormalities and reproductive failure in wildlife.

9.1.2 Run-off (Avg. Score: 2.00)

NJ Specific Threats: 9.1.2.1 Chemical fertilizers and nutrient run-off changes the pH in streams and ponds and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.1.2.2 Contaminants degrade aquatic and marine water quality and can bioaccumulate in benthic organisms, threatening wildlife by causing developmental and behavioral abnormalities and reproductive failure.

9.1.2.3 Contaminants from road runoff (oil, sediment, salt, etc.) impact native vegetation and the species that rely upon them, degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2 Industrial and Military Effluents

9.2.1 Oil Spills (Avg. Score: 3.00)

NJ Specific Threats: 9.2.1.1 Oil spills render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.1.2 Oil spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.1.3 Oil spills cause external oiling of wildlife and ingestion of oil, both of which can injure or kill wildlife.

9.2.2 Seepage from Mining (Avg. Score: 1.00)

NJ Specific Threats: 9.2.2.1 Contaminants from mining degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2.3 Other (Avg. Score: 2.00)

NJ Specific Threats:

9.2.3.1 Point and nonpoint source pollution such as polychlorinated biphenyls (PCBs), pesticides, heavy metals, and endocrine disrupting compounds (EDC's) into freshwater and marine systems pose threats to wildlife through direct contact and/or ingestion, and to aquatic species and their predators through bioaccumulation, impacting the reproductive success and neurological function of many avian and fish species.

9.2.3.2 Chemical spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.3.3 Chemical spills may render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.4 Other: Hydrofracturing (Avg. Score: 1.00)

NJ Specific Threats:

9.2.4.1 Contaminants from hydrofracturing degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2.4.2 Uncontrolled effluents escaping from hydrofracturing facilities can cause injury to wildlife and alter normal behaviors.

9.3 Agricultural and Forestry Effluents

9.3.1 Nutrient Loads (Avg. Score: 2.00)

NJ Specific Threats:

9.3.1.1 Chemical fertilizers and nutrient run-off changes the pH in streams, ponds and wetlands and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.3.1.2 Animal waste degrades terrestrial and aquatic habitats, especially streams, ponds and wetlands, resulting in eutrophication, which disrupts oxygen and nutrient balances, and causes injury and mortality to aquatic organisms.

9.3.1.3 Organic nutrient inputs from aquaculture may, depending upon type and location, adversely impact intertidal and subtidal habitats and water bodies where there is insufficient tidal flushing.

9.3.2 Soil Erosion and Sedimentation (Avg. Score: 1.00)

NJ Specific Threats:

9.3.2.1 Soil erosion, sedimentation and destruction of streambanks and riparian buffers degrade waters making them unsuitable for riparian-dependent wildlife.

9.3.3 Herbicides and Pesticides (Avg. Score: 2.00)

NJ Specific Threats:

9.3.3.1 Pesticides degrade terrestrial and aquatic habitats, especially streams, ponds and wetlands. Aquatic wildlife are particularly sensitive to these contaminants, which can cause developmental and behavioral abnormalities and reproductive failure. Some contaminants may bioaccumulate in predatory fish and birds and disrupt reproduction.

9.3.3.3 Use of pesticides can directly harm non-target species through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture (Avg. Score: 1.00)

NJ Specific Threats:

9.3.5.1 Use of pesticides, insecticides, and/or herbicides can directly harm non-target species, such as amphibians and beneficial invertebrates through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5.4 Improper use of current insecticides, such as those containing esfenvalerate, prallethrin, or piperonyl butoxide, or past use of pesticides containing chlordane still present in the soils, are toxic to various wildlife species, and can cause injury, mortality, or other effects that impair population viability.

9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.4 Garbage and Solid Waste

9.4.1 Direct hazards to wildlife (Avg. Score: 1.00)

NJ Specific Threats: 9.4.1.1 Wildlife may ingest garbage causing choking or impingement in the digestive system, or they may become physically entangled in it (e.g., plastic or abandoned fish nets); conditions that make them unable to feed or drink, cause them to suffocate or drown, or otherwise restrict the animal's movement making them more susceptible to predators, starvation or injury.

9.4.1.2 Garbage and solid waste destroys natural habitats and obstructs wildlife movements.

9.5 Air-Bourne Pollutants

9.5.1 Acid Rain (Avg. Score: 2.00)

NJ Specific Threats: 9.5.1.1 Causes acidification of water bodies, resulting in changes to aquatic and marine communities and reducing biodiversity, and creating conditions that are unsuitable for some aquatic (freshwater and marine) and semi-aquatic species that are sensitive to pH shifts.

9.5.1.2 Leaches calcium from the soils which in turn reduces the availability of prey, particularly calcium-rich prey such as snails.

9.5.6 Herbicides and Pesticides (Avg. Score: 1.50)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

9.6 Excess Energy

9.6.2 Thermal Pollution (Avg. Score: 2.00)

NJ Specific Threats: 9.6.2.1 Water temperature changes due to industrial discharge of heated water may impact species composition in the receiving waterbody. Species such as sea turtles and migrating fish may be attracted to the thermal plume and become more vulnerable to mortality during emergency shutdowns during cooler months.

9.6.2.2 Water temperature changes to aquatic systems can deter or preclude use by SGCN (e.g., alter habitat suitability for wildlife species, reduce prey base) or present stressors that are harmful if not fatal to wildlife.

9.6.3 Noise Pollution (Avg. Score: 2.00)

NJ Specific Threats: 9.6.3.1 Acute and chronic noise pollution in and adjacent to terrestrial and aquatic (marine and freshwater) environments could disrupt normal behaviors of wildlife such as migration, communication, feeding, eluding predators, resting and breeding, etc.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 2.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.2 Droughts

11.2.1 Droughts (Avg. Score: 3.00)

NJ Specific Threats: 11.2.1.1 Contribute to hardened soils, decreasing water recharge during rains and increasing the likelihood of flash floods during storms.

11.2.1.2 Lead to lower groundwater levels and therefore, less available water for people and habitats.

11.2.1.3 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

11.2.1.5 Leads to lower river levels that may impact the ability of anadromous species to reach spawning grounds.

11.3 Temperature Extremes

11.3.1 Temperature extremes (Avg. Score: 2.00)

NJ Specific Threats:

11.3.1.1 Increasing temperatures may cause habitat loss and degradation by desiccating and/or raising the temperatures of small wetlands and streams leading to the loss of freshwater mussels and other aquatic species and species reliant upon these habitats.

11.3.1.2 Increased temperatures can negatively impact wetland, riverine, lacustrine and vernal pool-associated or -dependent wildlife by reducing flows, increasing water temperatures, lowering water levels and causing premature drying of vernal habitats.

11.3.1.3 Temperature extremes of surface water and air degrades marine habitats and ecosystems, threatening marine wildlife. Such extremes also disrupt offshore currents and migratory patterns, species' ranges, and/or impact communities/food chains, all of which further impact the ecosystem.

11.3.1.4 Extremely low temperatures and/or extensive periods of unseasonably low temperatures during critical life history stages (e.g., hibernation, gestation/nesting) can alter animals' behaviors and decrease survivorship.

11.4 Storms and Flooding

11.4.1 Storms and flooding (Avg. Score: 2.00)

NJ Specific Threats:

11.4.1.1 Extreme storms and flooding events threaten aquatic and marine wildlife through habitat degradation and alteration, including alterations to off-shore or back-bay benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic and marine wildlife.

11.4.1.2 Potentially damage coastal habitats, including beach- and marsh-nesting bird habitats and interdunal wetlands, and can increase marsh erosion.

11.4.1.3 Increase risk of saltwater intrusion to freshwater habitats altering the water chemistry and potentially altering aquatic wildlife community.

11.4.1.4 Flood events alter river or stream morphology, benthic conditions and habitat availability for wildlife, cause bank erosion, and deposit sediments in floodplain wetlands altering wildlife habitat.

11.4.1.7 Potentially damage coastal habitats, including beach and marsh habitats used by spawning horseshoe crabs, nesting diamondback terrapins, and resting and foraging birds.

11.4.2 Increased rainfall (Avg. Score: 1.00)

NJ Specific Threats:

11.4.2.1 Extreme rain events threaten aquatic wildlife through habitat degradation and alteration, including alterations to benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic wildlife.

11.6 Phenology Shifting or Alteration

11.6.2 Phenology shifts related to predator-prey ecology (Avg. Score: 1.00)

NJ Specific Threats:

11.6.2.1 Alters inter-specific relationships (e.g., competition, parasitism, predation) of wildlife, ultimately leads to detrimental impacts on the ecological system.

11.6.2.2 Shifts timing of species migration, breeding and hibernation, and available food resources, causes redistribution of species, or mortality for species that are unable to relocate due to their already isolated habitat or limited mobility.

11.6.3 Phenology shifts related to species redistribution (Avg. Score: 1.00)

NJ Specific Threats:

11.6.3.1 Shifts in timing of species migration, breeding and hibernation, and available food resources, as a result of wildlife range shifts driven by climate change.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.3 Need to answer research question (Avg. Score: 2.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.4 Need to develop new technique (Avg. Score: 2.00)

NJ Specific Threats: 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 3.00)

NJ Specific Threats: 12.3.0.6 Certain geographic or habitat features, such as vernal pools and headwater wetlands or streams, may be too small, mischaracterized, or misidentified to benefit from regulatory protection.

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.8 Lack of stable funding to support State marine fisheries research, monitoring, and management is a significant impediment to biologically-based management of fish and shellfish populations in New Jersey, which can result in overharvest and severe population declines.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 1.00)

NJ Specific Threats: 12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 2.00)

NJ Specific Threats: 14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 2.00)

NJ Specific Threats: 14.2.1.2 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various aquatic and riparian management practices.

14.2.1.3 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various coastal management practices.

14.2.1.4 Need to develop greater understanding of and support for efforts implemented to maintain disturbance-free habitats that allow coastal wildlife populations to thrive alongside human residential and recreational uses.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 2.00)

NJ Specific Threats: 15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.14 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of herbicides and pesticides, and implementing more ecologically safe strategies when using such products.

1.2.1.23 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to provide cost shares and/or plan approvals for management based on management approaches and prescriptions.

2 Direct Management of Natural Resources

2.2 Dam and barrier removal

2.2.1 Culvert work

2.2.1.1 Replace existing barriers to wildlife movement with and/or install appropriately-sized systems to accommodate wildlife dispersal.

2.2.5 Obstruction removal

2.2.5.1 Enhance fish SGCN habitats by removing obstructions to fish passage to benefit those species.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.4 Restore and/or enhance suitable travel corridors connecting conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats.

2.10.0.18 Implement a habitat improvement and restoration program to restore cold-water fish habitat, ecosystems and populations.

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.12 Water management

2.12.5 Spring development

2.12.5.1 Implement a habitat improvement and restoration program to restore cold-water fish habitat, ecosystems and populations.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.6 Conduct long-term studies on resident and migratory SGCN to determine if there are changes to the populations' demography (productivity, survival, dispersal) and/or to their critical and/or supporting habitats (i.e., diminishing in value, acreage or connectivity, etc.), in particular changes that would not maintain SGCN at viable levels for species populations. Update data and GIS maps; provide updated information to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.11 Develop, implement and evaluate the effectiveness of town plans that avoid impacts to SGCN species and their habitats.

3.0.0.12 Compile available life history information on urban-associated SGCN (e.g., predators, levels of nest/young depredation, breeding longevity and reproductive effort over time, preferred nesting/reproductive requirements, fidelity to breeding and wintering sites, comprehensive assessment of migration routes and destinations) for future development of management strategies to benefit such species.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.14 Identify areas with invasive, aquatic plants and animals and collect a detailed baseline assessment of the species' status and distribution. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort. Researchers and contractors performing Forest Stewardship Inventories and/or Plans on state lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.0.0.15 Conduct long-term monitoring of areas identified as having invasive, aquatic plants and animals to track the species' status/progress over time with or without the implementation of management strategies. Areas without management strategies should be assessed and prioritized for management/control. Areas where management strategies are being implemented should include an assessment of the management effort and identify/recommend and implement necessary changes to improve its success. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort.

3.0.0.19 Identify the presence and status (e.g., functioning, structure, slated for removal, etc.) of existing dams and culverts within and/or that may impact SGCN and their habitats, and create a database that includes a GIS component identifying the locations of such structures and their status. Share this information with appropriate organizations and/or agencies evaluating the benefits and risks of such structures on SGCN and their habitats.

3.0.0.20 Once baseline data identifying and describing the status of existing dams and culverts have been gathered, conduct evaluations at a variety of sites to determine whether the benefits of culvert and dam creation or removal outweigh the risks to SGCN species and their habitats, and if other variables/conditions specific to individual sites/locations result in a different outcome. Identify and target appropriate dams and culverts for removal and/or reconstruction to minimize harm to SGCN species and their habitats.

3.0.0.21 Conduct long-term monitoring to determine the impacts of the fish and shellfish aquaculture industries on focal and non-focal SGCN and their habitats (i.e., NJ bays, estuaries, ocean areas). Assess the success of management actions implemented to minimize these impacts and make specific recommendations to the NJ DEP regarding how such management efforts may be improved to minimize harm to wildlife and their habitats.

3.0.0.22 Develop, implement and evaluate the success of a habitat improvement and restoration program to restore cold-water fish habitat, ecosystems and populations.

3.0.0.23 Identify (through wildlife and aquatic system surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and research water quality parameters for all [types of] aquatic systems for various SGCN populations.

3.0.0.25 Identify pathways of migratory SGCN in the Atlantic Coastal and Marine Regions (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and use the data to help evaluate the potential short- and long-term impacts of wind turbines, radio towers, utility guy lines, and other tall coastal structures on migratory populations.

3.0.0.26 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species including objectives and guidance pertaining to and the condition/status of critical and supporting habitats.

3.0.0.27 Evaluate the effectiveness of strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals through research and monitoring. Develop and provide NJ DEP and other appropriate governing agencies/commissions a summary of findings and recommendations to improve such efforts.

3.0.0.28 Evaluate best management practices for using mined sand or dredged material to improve habitat for wildlife, particularly for spawning horseshoe crabs and migrating shorebirds.

3.0.0.29 Conduct long-term monitoring of sensitive marine species habitats and migration and/or spawning areas to determine their continued use or changes as a result of habitat shifts or alterations that may warrant further management actions.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.2 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.0.4 Conduct long-term monitoring of the impacts of contaminants to vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.2.0.6 Develop, implement and conduct studies to evaluate the effectiveness of methods implemented to reduce road mortality of wildlife (e.g. wildlife underpasses, road closures).

3.2.0.7 Track (via a database that includes a GIS component) and research problematic species and diseases to determine their distribution, impacts on SGCN wildlife/wildlife communities, and develop potential control measures.

3.2.0.8 Implement and conduct long-term monitoring of control measures aimed at minimizing the impacts of problematic species and/or diseases to evaluate the effectiveness of such efforts and to identify and incorporate additional strategies as appropriate.

3.2.0.10 Evaluate the effectiveness of sanitation/decontamination protocols in minimizing the transference of wildlife diseases and invasive plant species.

3.2.0.13 Continue the research and studies undertaken by the State's Shad and River Herring/Alewife Technical Working Group regarding an assessment to determine if the herring should be listed as a "stock in the fishery."

3.2.0.14 Identify spawning areas for species such as Atlantic and Shortnose sturgeon, Alewife, and Blueback Herring, and document shifts of these areas over time. Assess their reproductive success over time, including fecundity, early life stages and juvenile success, etc.

3.2.0.16 Conduct long-term monitoring to evaluate the success of marine conservation zone designations on marine SGCN.

3.2.0.18 Conduct baseline surveys/inventories to better understand the distribution of fish and invertebrate (including freshwater mussels) populations.

3.2.0.19 Develop, implement and evaluate aquaculture practices in coastal areas that are compatible with the recovery of SGCNs and industry needs.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.2 Age, size and sex structure

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.3 Baseline inventory

3.2.3.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) suitable areas for marine conservation zone designation and promote policies and regulations that support the designation of such areas.

3.2.3.4 Establish population estimates and trends for all managed fish species.

3.2.3.5 Investigate and develop strategies to reduce "by-catch" of SGCN and other non-target species. Present findings and strategies to NJ DEP and conservation organizations for review and possible implementation. Develop a database documenting by-catch for use in management planning decisions.

3.2.4 Food habits

3.2.4.1 Monitor and investigate the populations and health of SGCN prey/food resources for those SGCN whose populations are thought to be limited due wholly or in part to a lack of food resources or toxins in food resources.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.10 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and document fish SGCN habitats by plotting their distributions in GIS and submitting the data to the State for integration into the DEP's Biotics database.

3.3.1.15 Conduct a literature review to determine the potential impacts of underwater vibrational noise on marine mammals, sea turtles and fishes emanating from offshore wind turbines during routine operations.

3.3.1.16 Gather "best information" for spatial modeling and update/create a current model/depiction of anticipated habitat shifts from sea-level rise, flooding, etc.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.1.27 Develop a matrix that lists every commercial and recreational fishery and aquaculture facility that operates in state waters and for each fishery listed, provide details regarding their fishing seasons, gear descriptions, locations and number of fishers. Add a GIS component to overlay species of concern and sensitive areas.

3.3.2 Monitoring

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.4 Protect water quality and aquatic-dependent species by appropriately designating Category 1 waters and enforcing protective regulations. Seek appropriate classifications for stream segments based on Endangered and Threatened Status and/or the Index of Biotic Integrity (IBI) results that do not fulfill Category One requirements.

3.3.2.5 Conduct long-term monitoring of water quality of SGCN aquatic habitats (and aquatic systems feeding into those habitats) to evaluate protection and management efforts to reduce, if not eliminate, chemical contamination, siltation, eutrophication, and other forms of pollution/contamination of aquatic systems.

3.3.2.14 Research and evaluate the effectiveness of water quality management practices on water-dependent and semi-dependent SGCN, particularly those practices associated with permitting or mitigation actions.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5 Techniques development

3.5.1 Artificial propagation studies

3.5.1.1 Conduct studies to evaluate the impacts (beneficial and detrimental) of aquaculture on migratory shorebirds, waterfowl, finfish, shellfish and other SGCN and their habitats, including evaluation of the relative effects of location and aquaculture techniques.

3.5.1.2 Develop and conduct studies that evaluate relative efficacy and feasibility of management actions designed to minimize adverse impacts and enhance beneficial effects.

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.8 Develop best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5.3.9 Develop strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

3.5.3.10 Develop a habitat improvement and restoration program to restore cold-water fish habitat.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.12 Develop management actions to minimize the documented adverse impacts and reduce risks of potential adverse impacts of aquaculture on migratory shorebirds and other SGCN, including waterfowl, finfish, and shellfish and their habitats.

3.5.3.14 Develop aquaculture practices in the coastal areas that are compatible with the recovery of SGCN.

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.3.16 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.3.23 Revise water quality management practices based on research on water-dependent and semi-dependent SGCN, particularly when associated with permitting or mitigation actions.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.3.27 Conduct an assessment and develop a location list of available equipment for boom deployment during oil spills.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.5 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

3.5.4.6 Investigate the feasibility of mitigating for the impacts of contaminants to vulnerable wildlife, particularly SGCN. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.5.4.8 Develop a habitat improvement and restoration program to restore cold-water fish ecosystems and populations.

3.5.4.11 Develop aquaculture practices in the Delaware Bay that are compatible with the recovery of SGCN.

3.5.4.12 Investigate and develop strategies to reduce "by-catch" of SGCN and other non-target species. Present findings and strategies to NJ DEP and conservation organizations for review and possible implementation. Develop a database documenting by-catch for use in management planning decisions.

3.5.4.13 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.4.14 Develop and implement agreements, and update existing agreements, with government agencies regarding the protection of critical SGCN habitats (e.g., significant breeding populations of beach nesting birds, colonial waterbird nesting areas, bat colonies, etc.).

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.17 Investigate new, non-invasive techniques for SGCN population evaluation through literature review, expert opinion, trial studies (if low risk), etc.

3.5.4.18 Investigate the effectiveness of survey techniques through selected "ground truthing" and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

3.5.4.21 Develop BMPs to address problematic species and diseases of unknown origin.

3.5.4.22 Investigate the efficacy of implementing strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities.

3.5.4.23 Reduce the impacts of entrainment, impingement and thermal discharge at power plants by working with conservation partners, academia, etc. to ensure that best available technologies are utilized wherever possible.

4 Education

4.1 Educator/Instructor training

4.1.1 Aquatic resource education

4.1.1.1 Provide educational resources and training programs to teachers in aquatic resource education that includes information regarding climate change and sea-level rise for incorporation into the class curriculum and/or as the focus of school field trips.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.3 Secure and protect riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.4 Secure and protect fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.5 Secure and protect critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.3 Increase the protection of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through conservation area designations.

6.3.0.4 Promote the protection of fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through conservation area designations.

6.3.0.9 Promote the protection of critical marine habitats for SGCN through conservation area designations.

7 Law Enforcement

7.1 Law enforcement

7.1.3 Sub-national Level

7.1.3.2 Increase the number of law enforcement officers tending to wildlife issues to a reasonable number to sufficiently cover the State and marine waters.

7.1.4 Scale Unspecified

7.1.4.1 Improve enforcement of policies and/or regulations that promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

7.1.4.4 Improve enforcement of policies/regulations aimed at protecting and preserving critical coastal and marsh habitats, and secure mitigation for losses that create an environmental benefit.

7.1.4.5 Enforce current policies and/or regulations to increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal SGCN, and implement and enforce amended policies/regulations.

7.1.4.6 Recruit law enforcement to assist in the protection and enhancement of SGCN populations, in particular endangered species, through improved awareness of species through trainings, partnerships, and other methods. Information should include but is not limited to: 1) Issues concerning illegal collection of reptiles, 2) Persecution of rare snakes, 3) Illegal recreational activities on public lands (e.g., off-road vehicles) and their impact on wildlife, 4) Identification of sensitive areas, critical sites and/or "hot-spots" for collection.

7.1.4.7 Increase law enforcement presence to enforce regulations governing recreational activities (e.g., the use of personal watercraft and off road vehicles, caving, rock climbing, etc.) on conserved lands and within other sensitive habitats, and discourage activities that cause harm or disturbance to vegetation, wetlands, fish and wildlife.

7.1.4.9 Implement policies that improve and secure habitat connections between conserved SGCN habitats.

7.1.4.10 Implement policies that promotes expanding acreages and enhances the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

7.1.4.11 Implement and enforce policies/regulations that will increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.17 Improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

7.1.4.20 Implement policies and/or regulations with the objective of reducing "by-catch" of SGCN and other non-target species.

7.1.4.26 Educate law enforcement personnel that there may be unauthorized research projects taking place and to encourage them to investigate any activities that appear to be harmful to wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.1 Coordinate research efforts among government agencies, non-government conservation partners and other stakeholders to investigate the impacts of aquaculture on migratory shorebirds, waterfowl, finfish, shellfish and other SGCN and their habitats, to determine relative effects of farming locations and aquaculture techniques, and to evaluate management actions to minimize such impacts.

8.1.0.2 Develop a team of personnel from government entities, conservation organizations and other stakeholders engaged in oil/gas spill response for marine and freshwater habitats to develop a feasible plan for oil spill response and/or to amend NJ's current oil spill response plan that clearly outlines each organizations responsibilities and an assessment and location list of available equipment for boom deployment during oil spills.

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.1.0.6 Engage government agencies, conservation partners and other stakeholders in discussions focused on sharing information regarding coastal and marine critical wildlife habitats, developing comprehensive mapping to assist in reducing impacts of energy production activities, and establishing a long-term monitoring program to update the data. Ensure this information is available to appropriate personnel for planning or response measures.

8.1.0.8 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting sportsmen's organizations and fisheries addressing the potential effects of over-harvesting wildlife and promote "catch and release".

8.1.0.9 Review the marine fish code enforcement policies relative to SGCN or sensitive game species' populations and fecundity, and amend the harvest quota or "bag limits" as needed, and address enforcement of such quotas.

8.1.0.10 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting sportsmen's organizations and fisheries, as well as public constituents, addressing the potential impacts of over-harvesting wildlife can have on the ecological system and to promote "sustainable harvest".

8.1.0.11 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting sportsmen's organizations and fisheries, as well as public constituents, addressing the unintended effects abandoned fishing gear, tackle and crab pots can have on wildlife, and promote the collection and/or reporting of abandoned items and their locations.

8.1.0.12 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting sportsmen's organizations and fisheries, as well as public constituents, addressing the unintended effects fishing gear and tackle can have on wildlife.

8.1.0.13 Engage DOD in a constructive dialogue regarding strategies to minimize disturbances to all SGCN (i.e., beyond their federal requirements) from forest management and other practices on their lands.

8.1.0.14 Engage DOD in a constructive dialogue regarding strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities.

8.1.0.18 Engage NJDOT, NJ Transit Authority and other road management entities, wildlife conservation organizations/agencies (e.g., Division of Fish and Wildlife, New Jersey Conservation Foundation, Conserve Wildlife Foundation of NJ), and communities and citizens in discussions regarding the importance of and methods to enhance habitat connectivity, and work together to develop feasible strategies for ensuring that wildlife can disperse naturally and safely across roads and similar barriers to terrestrial and/or aquatic habitats.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.27 NJ Division of Fish and Wildlife and their Game Council, and appropriate conservation partners and other stakeholders to review the freshwater fish code relative to SGCN or sensitive game species' populations and fecundity, and support amendments to the harvest quota or "bag limits" as needed.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.31 Encourage government agencies, conservation partners and other stakeholders to work together to create GIS mapping for marine wildlife and habitat to assist in reducing impacts of energy production activities. Ensure this information is available to appropriate personnel for planning or response measures.

8.1.0.32 Work with NJ DEP's Water Management, other state agencies and watershed organizations to determine if mitigation is warranted at applicable power plants.

8.1.0.34 Work with the NJ Education Association and Department of Education to design curriculum and outdoor experimental learning opportunities, and provide training to teachers on implementation of these activities.

8.1.0.36 Reduce "by-catch" of SGCN and other non-target species by enlisting voluntary cooperation to use exclusion devises, appropriate trap sizes, etc. through education and outreach.

8.1.0.46 Form cooperative partnerships with dredging companies to facilitate habitat creation and enhancement within project areas, and to identify seasonal timing of activities that would minimize impacts to wildlife and their habitats.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.1.0.48 Form cooperative partnerships with transportation and shipment agencies and companies to facilitate habitat creation and enhancement away from and outside of project areas and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.1.0.49 Reduce the impacts of entrainment, impingement and thermal discharge at power plants by working with conservation partners, academia, etc. to ensure that best available technologies are utilized wherever possible.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.1 Utilize WSFR grant funds, in combination with alternate funding sources as needed, to implement a scientific data-driven, extensive educational/outreach program targeting sportsmen's organizations and fisheries, as well as public constituents, addressing the potential impacts of over-harvesting wildlife can have on the ecological system and to promote "sustainable harvest".

8.3.0.2 Utilize WSFR grant funds, in combination with alternate funding sources as needed, to implement an extensive educational/outreach program consisting of displays, fliers, list-serve mailings, Facebook posts and speaking engagements with sportsmen's organizations and fisheries, as well as public constituents, addressing the unintended effects fishing gear and tackle can have on non-target species.

8.3.0.3 Utilize WSFR grant funds, in combination with alternate funding sources as needed, to implement catch and release outreach program(s).

8.3.0.4 Utilize WSFR grant funds, in combination with alternate funding sources as needed, to implement an extensive educational/outreach program consisting of displays, fliers, list-serve mailings, Facebook posts and speaking engagements with sportsmen's organizations and fisheries addressing the unintended effects abandoned fishing gear, tackle and crab pots can have on wildlife.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.14 Develop an educational outreach program using a variety of media to ensure maximizing the distribution of information, in particular targeting sportsmen's organizations and fisheries, regarding the unintended effects abandoned fishing gear, tackle and crab pots can have on wildlife, including non-target species.

8.3.0.16 Develop an educational outreach program using a variety of media to ensure maximizing the distribution of information, in particular targeting sportsmen's organizations and fisheries, promoting "catch and release" and the impacts excessive harvests can have on wildlife populations.

8.3.0.17 Develop an educational outreach program using a variety of media to ensure maximizing the distribution of information, in particular targeting sportsmen's organizations and fisheries, promoting "sustainable harvest" using scientific data, and garner support from constituents through this outreach.

8.3.0.20 Develop an educational outreach program for landowners, particularly those in the coastal and bay areas, boaters, and the general public with information about the negative impacts on marine wildlife and habitats, and steps they can implement to reduce these impacts.

8.3.0.22 Post signage in sensitive coastal habitats (e.g., bird and Diamondback Terrapin nesting areas) to educate the boating community on responsible use of these areas.

8.3.0.29 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about the importance of maintaining a vegetative buffer along riparian and aquatic habitats to intercept storm water runoff and minimize soil erosion.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.7 Develop a plan that directs the maintenance of or new channelization of forested streams and rivers in a manner that minimizes impacts of the aquatic ecological system and adjacent forest

9.1.0.8 Develop a plan that focuses on strategies for oil pipelines to avoid sensitive habitats that would be highly impacted by oil spills.

9.1.0.15 Develop a plan to minimize fragmentation of terrestrial and aquatic habitats by roads.

9.1.0.17 Develop a plan to minimize nutrient and effluent loads from aquaculture practices.

9.1.0.21 Develop a plan to minimize the use of any-sized dam in critical forested areas.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.23 Develop a plan to mitigate the effects of transportation barriers by using CHANJ products.

9.1.0.26 Develop a plan to minimize any adverse impacts of aquaculture farming techniques and structures on freshwater and intertidal habitats.

9.1.0.27 Develop a plan to use wildlife-appropriate culverts in critical forested areas.

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.32 Incorporate aquatic habitat connectivity and water quality/effluent standards into local and state aquaculture plans and BMPs.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.1 Develop a management plan specific to River Herring/Alewife to ensure a sustainable population in perpetuity.

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.5 Develop response plans to address disease outbreaks within wildlife populations, in particular SGCN.

9.3.1.6 Amend NJ's current oil spill response plan to 1) expand the geographic area addressed, 2) expand the targeted species impacted and in need of recovery, and 3) revise current and integrate new actions into the plan as needed.

9.3.1.7 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.10 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.15 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.1.16 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.2 Listed species recovery planning

9.3.2.1 Develop proactive species recovery plans for all endangered and threatened species including guidance and objectives pertaining to critical and supporting habitat to meet and maintain recovery goals.

9.3.3 Habitat management planning

9.3.3.6 Develop a management plan for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

9.3.3.8 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.3.9 Develop a response plan to outbreaks using BMPs to control infestations and limit their spread in a way that avoids excessive harm to non-target species.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.3.14 Develop a management plan using aquaculture practices in coastal areas that are compatible with the recovery of SGCN.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.16 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.21 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.3.22 Create management plans to minimize and/or prevent wildlife road mortality that will incorporate wildlife passages in conjunction with barrier fencing and, where possible, seasonal closures. Aquatic-associated passages must avoid disturbance to the natural streambeds and riparian habitat, permit high volumes of water to flow freely, and provide adequate travel corridors for terrestrial wildlife, while maintaining stream flow for fish passage. Bridges that span rivers and streambeds and include floodplain habitat on either side of the span to provide travel corridors for terrestrial wildlife are preferred over culverts.

9.3.3.24 Develop a plan to improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

9.3.3.25 Develop a habitat management plan focused on areas important to near-shore, coastal species (e.g., herring, sturgeon, terrapin, nesting birds) that prioritizes these areas to direct resources to minimize the impacts of sea-level rise, flooding and storms (including extreme rain events) such as increased erosion of beach, mudflat and marsh habitats, and the increased risk of saltwater intrusion into freshwater habitats. Gather "best information" for spatial modeling of anticipated habitat shifts from sea-level rise, flooding, etc.

9.3.3.28 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.3.32 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.9 Review strategies for creating or enhancing connectivity (e.g., installing appropriately-sized wildlife passages) between wetlands to allow wildlife to disperse naturally and safely.

11.1.1.10 Use CHANJ mapping in reviews of proposed energy, mining, transportation and utility service companies/agencies' projects to attempt to maintain habitat connectivity and reduce fragmentation, and identify potential impacts of the projects.

11.1.1.11 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed offshore energy projects relating to drilling, extraction and distribution of petroleum and gas products to reduce habitat destruction and minimize impacts on wildlife.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.2.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into the environmental review process to help establish policies and plans that minimize the impact of aquaculture on fish and wildlife.

11.1.2.4 Review strategies for creating or enhancing connectivity (e.g., installing appropriately-sized wildlife passages) between wetlands to allow wildlife to disperse naturally and safely.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.7 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on the importance of maintaining habitat connectivity, minimizing fragmentation, and the use of CHANJ products to help them target areas for such planning.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.14 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters), and to enhance or restore biologically appropriate buffers.

11.2.0.18 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats.

11.2.0.25 Provide educational resources, training programs, and on-the-ground guidance to resource managers regarding the assessment of and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) related to residential and commercial development.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.3 Provide educational resources, training programs, and on-the-ground guidance to DOD to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop and implement forest management and other practices that minimize disturbances to SGCN (i.e., beyond their federal requirements).

11.2.1.4 Provide educational resources, training programs, and on-the-ground guidance to dredging companies and resource managers on habitat creation and enhancement away from and outside of shipping lanes, and to identify seasonal timing of activities that would minimize impacts to wildlife and their habitats.

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

100 Law and Policy

100. Legislation

100.1.3 Sub-national Level

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.3.4 Initiate legislative action to establish an annual budgetary line item designating funds to support programs and monitoring stations throughout Barnegat, Little Egg Harbor and Great Bay focused on long-term monitoring of submerged aquatic vegetation, both native and exotic species.

100.1.4 County and Local

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.3 Expand the acreages and enhance the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN through local ordinances.

100.1.4.4 Secure wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and biologically appropriate buffers through local ordinances.

100.1.4.6 Secure fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through local ordinances.

100.1.4.8 Secure critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through local ordinances.

100.1.4.14 Adopt/pass local ordinances which require assessing and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into state/local policy to minimize the impact of aquaculture on fish and wildlife.

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.1 Develop (and/or improve) policies and/or regulations that will promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

100.3.0.4 Promote policies and regulations that support marine conservation zone designations in suitable areas identified through research and literature.

100.3.0.5 Develop policies that will promote improved and secure habitat connections between conserved SGCN habitats.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.7 Amend current policies and/or regulations to increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.14 Develop policies and/or regulations that increase the protective buffers of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) to biologically appropriate distances to benefit SGCN that rely upon these habitats and improve the function of the [associated] aquatic systems.

100.3.0.17 Develop and implement policies and/or regulations with the objective of reducing "by-catch" of SGCN and other non-target species.

100.3.0.21 Develop policies that minimize wildlife road mortality through: 1) Requiring the integration of wildlife passages into all new and repaired roads, in particular those areas that will connect SGCN habitats, 2) Requiring current fish/wildlife passages be improved and maintained in perpetuity, 3) Supporting seasonal road closures, in particular for unimproved roads, 4) Supporting projects that work to improve connectivity of SGCN habitats such as land conservation through acquisition or other means.

100.3.0.23 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.25 Amend the harvest quota or "bag limits" within the freshwater fish code relative to SGCN or sensitive game species' as needed.

100.3.0.26 Adopt regulations requiring the combined sewer overflow alternative analyses required by regulation address potential impacts to wildlife in watercourses or receiving water bodies.

100.3.0.27 Amend harvest, license and/or permit requirements to incorporate guidance regarding the use of gear and/or tackle and current best practices to minimize bycatch or entanglement of non-target species.

100.3.0.28 Amend harvest, license and/or permit requirements to require mandatory reporting by permittees/licensees of lost harvest gear, by-catch and, entanglement of non-target species.

100.3.0.31 Create or expand tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMPs.

100.3.0.34 Create legislation or policy that identifies River Herring/Alewife as a stock in the fishery thereby requiring its own Atlantic State Marine Fisheries management plan.

100.3.0.35 Incorporate Freshwater Fish Status Assessment (Delphi Technique) results pertaining to endangered and threatened species into regulations.

100.3.0.37 Develop a law and/or policy that requires NJ DEP to continue to address and correct the allowable combined sewer overflow inputs of solid waste into the marine environment to minimize harm to wildlife and their habitats.

100.3.0.38 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.3.0.39 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.3.0.42 Fully adopt the former Storm water Management Rules' 300ft buffer requirements into the Flood Hazard Area Control Act Rules.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.47 Investigate regulatory options available to direct the location of aquaculture activities in Aquaculture Development Zone 4 (Delaware Bay area) in a manner which minimizes the loss of wildlife habitats and adverse impacts to the environment.

100.3.0.48 Propose new State law or regulation mandating that a State-level "development impact fee" be assessed on all new development approved by municipalities (via the Municipal Land Use Law processes), and dedicate such monies to the development and implementation of regional Habitat Conservation Plans (or existing plans/programs serving the same regional function).

100.3.0.49 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address the issue of disturbance to habitat or species as a result of human activities (e.g., construction, bridge maintenance, road work, etc.).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.51 Amend the harvest quota or "bag limits" within the marine fish code enforcement policies relative to SGCN or sensitive game species' as needed.

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.55 Develop regulations to address potentially adverse effects of aquaculture on SGCN species and their habitats.

100.3.0.57 Develop regulations that when implemented will improve and secure habitat connections between conserved SGCN habitats.

100.3.0.58 Develop regulations that when implemented will promote the expansion of acreages and enhancement of the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.59 Develop regulations that when implemented will increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.66 Develop regulations with the objective of reducing "by-catch" of SGCN and other non-target species.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.2 Create a policy that requires the NJ DEP to incorporate scientific information regarding climate change and sea level rise (e.g., predictions, habitat management/acquisition efforts to enhance resilience to inundation) on their websites and to work with other government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

100.4.0.4 Create a policy that requires the use of wildlife habitat and corridor mapping products for both regulatory use when conducting project reviews and planning/siting new or expanded rights-of-way projects.

100.4.0.6 Create legislation or policy that identifies River Herring/Alewife as a stock in the fishery thereby requiring its own Atlantic State Marine Fisheries management plan.

100.4.0.7 Develop a law and/or policy that requires NJ DEP to continue to address and correct the allowable combined sewer overflow inputs of solid waste into the marine environment to minimize harm to wildlife and their habitats.

100.4.0.8 Develop a white paper addressing the impacts that existing, new or expanded rights-of-way have upon wildlife, wildlife habitats and habitat connectivity.

100.4.0.9 Develop and implement policies to minimize the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats in order to benefit wildlife.

100.4.0.10 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.4.0.11 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.4.0.13 Develop policies for different circumstances (e.g., roadsides and medians, riparian, aquatic and terrestrial habitats) that outline appropriate habitat/vegetation management strategies and schedules to minimize risks to and benefit wildlife.

100.4.0.19 Develop regulations that will minimize the creation of new barriers, remove or replace current barriers with appropriately-sized systems to accommodate wildlife dispersal, and to minimize road widening and traffic volume increases within critical wildlife habitat areas.

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.21 Ensure that Section 303(d) of the Clean Water Act and applicable State statutory/regulatory requirements for surface water pollutant budgets are being met by monitoring and enforcing regulatory Total Maximum Daily Load (TMDL) targets established within regional Water Quality Management Plans.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Brook Trout

Focal species that comprise this Conservation Target:

Brook Trout

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:

- 1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.1.1.2 Loss, alteration and/or degradation of habitat.
- 1.1.1.5 Impervious surfaces can lead to a decrease in water recharge.
- 1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.
- 1.1.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:

- 1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.2.1.2 Loss, alteration and/or degradation of habitat.
- 1.2.1.5 Impervious surfaces can lead to a decrease in water recharge.
- 1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.
- 1.2.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats:

- 1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.3.1.2 Loss, alteration and/or degradation of habitat.
- 1.3.1.4 Impervious surfaces can lead to a decrease in water recharge.
- 1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.
- 1.3.1.6 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture (Avg. Score: 1.00)

NJ Specific Threats: 2.1.1.3 Conversion of agricultural landscape that results in increased erosion, runoff, and chemical and thermal pollution decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.1.2 Small-holder Farming (Avg. Score: 1.00)

NJ Specific Threats: 2.1.2.2 Fragments terrestrial and aquatic habitats.

2.1.3 Agro-industry (Avg. Score: 1.00)

NJ Specific Threats: 2.1.3.2 Fragments terrestrial and aquatic habitats.

2.3 Livestock Farming and Ranching

2.3.2 Small-holder Grazing (Avg. Score: 2.00)

NJ Specific Threats: 2.3.2.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.2.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

2.3.3 Agro-industry Grazing (Avg. Score: 2.00)

NJ Specific Threats: 2.3.3.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.3.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

2.4 Marine and Freshwater Aquaculture

2.4.1 Subsistence/Artisinal Aquaculture (Avg. Score: 1.00)

NJ Specific Threats: 2.4.1.2 Increased risk of parasite introduction into marine environments.

2.4.1.3 Potential for increased nutrient and effluent loads.

2.4.1.7 Potential for fish to escape and compete with, predate upon, interbreed with, or spread disease to SGCN fish species.

2.4.2 Industrial Aquaculture (Avg. Score: 1.00)

NJ Specific Threats: 2.4.2.2 Increased risk of parasite introduction into marine environments.

2.4.2.3 Potential for increased nutrient and effluent loads.

2.4.2.7 Potential for fish to escape and compete with, predate upon, interbreed with, or spread disease to SGCN fish species.

3 Energy Production and Mining

3.1 Oil and Gas Facilities and Pipelines

3.1.1 Distribution processes of petroleum and other liquid hydrocarbons (Avg. Score: 2.00)

NJ Specific Threats: 3.1.1.2 Loss, alteration and/or degradation of habitat.

3.1.1.3 Increased risk of oil spills.

3.1.2 Natural gas distribution processes (Avg. Score: 2.00)

NJ Specific Threats: 3.1.2.1 Fragments terrestrial and aquatic habitats.

3.1.2.2 Loss, alteration and/or degradation of habitat.

3.1.2.3 Increased risk of gas leaks and explosions.

3.2 Mining and Quarrying

3.2.2 Surface Mining - Rock Quarry (and sand quarries) (Avg. Score: 1.00)

NJ Specific Threats: 3.2.2.1 Fragments terrestrial and aquatic habitats.

3.2.2.2 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

3.4 Conventional Power Plants

3.4.0 Conventional Power Plants (Avg. Score: 2.00)

NJ Specific Threats: 3.4.0.2 Loss, alteration and/or degradation of habitat due to new or the expansion of current facilities.

3.4.0.3 Alteration of the temperature, pH and/or hydrology of aquatic ecosystems change plant communities and can harm wildlife and/or impact their behavior and survivorship.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats: 4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.1.1.4 Re-establishment of abandoned railroad lines may increase the risk of direct mortality on wildlife.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads (Avg. Score: 1.00)

NJ Specific Threats: 4.2.1.4 Lines that cross or run parallel to streams result in a loss or reduction of vegetated riparian buffers and streamside shading, affecting water quality and in-stream habitat for aquatic biota.

4.3 Shipping Lanes

4.3.2 Dredging impacts (Avg. Score: 1.00)

NJ Specific Threats: 4.3.2.1 Threatens wildlife by disrupting/removing stream bottom habitat.

5 Biological Resource Use

5.2 Gathering Terrestrial Plants

5.2.3 Control (Avg. Score: 1.00)

NJ Specific Threats: 5.2.3.3 Removal of riparian or near-stream vegetation alters water quality and in-stream habitat for aquatic organisms by reducing streamside shading, increasing bank erosion, and affecting the natural filtering ability of trees, shrubs, and grasses.

5.3 Logging and Wood Harvesting

5.3.1 Intentional Use (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.1.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.2 Intentional Use (large scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.2.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.3 Unintentional effects (subsistence/small scale) (Avg. Score: 2.00)

NJ Specific Threats: 5.3.3.2 Poorly planned/implemented tree harvesting adjacent to waterways and vernal pools can lead to increased water temperatures, soil erosion and sedimentation, and reduces the potential for woody debris within the aquatic system, leading to negative impacts on wildlife.

5.3.4 Unintentional effects (large scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.4.3 Poorly planned/implemented tree harvesting adjacent to waterways and vernal pools can lead to increased water temperatures, soil erosion and sedimentation, and reduces the potential for woody debris within the aquatic system, leading to negative impacts on wildlife.

5.3.4.4 Infrastructure and/or equipment use may result in subtle changes to drainage patterns, adversely affecting vernal pool and wetland hydrology.

5.4 Fishing and Harvesting of Aquatic Resources

5.4.1 Intentional Use (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.4.1.3 Collection of fish for food, bait, or aquarium trade can lead to population exploitation.

5.4.2 Intentional Use (large scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.4.2.2 Collection of fish for food, bait, or aquarium trade can lead to population exploitation.

5.4.3 Unintentional effects (subsistence/small scale) (Avg. Score: 3.00)

NJ Specific Threats: 5.4.3.4 Fish introduced for sport fishing can negatively impact native species by competing for resources and/or altering the habitat (e.g., disrupting benthic communities and/or severely impacting aquatic vegetation).

5.4.3.7 Improperly sanitized equipment, relocation of fish, importation and release of non-native species, and the use of bait from a different location can spread invasive species and diseases from one waterbody to another.

5.4.4 Unintentional effects (large scale) (Avg. Score: 3.00)

NJ Specific Threats: 5.4.4.1 Fish introduced for sport fishing can negatively impact native species by competing for resources and/or altering the habitat (e.g., disrupting benthic communities and/or severely impacting aquatic vegetation).

5.4.4.7 Improperly sanitized equipment, relocation of fish, use of bait from a different location, can spread invasive species and diseases from one waterbody to another.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized) (Avg. Score: 1.00)

NJ Specific Threats: 6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.

6.3 Work and Other Activities

6.3.1 Unauthorized research projects at significant habitats (Avg. Score: 1.00)

NJ Specific Threats: 6.3.1.1 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.1.2 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.1.4 Illegal transfer of freshwater fish from one waterbody/watershed to another can result in the spread of non-native, invasive and/or undesirable fish or mussel species and/or diseases.

6.3.2 Authorized research projects at significant habitats (Avg. Score: 1.00)

NJ Specific Threats: 6.3.2.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.2.3 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.2.5 Authorized transfer of freshwater fish from one waterbody/watershed to another can result in the spread of non-native, invasive and/or undesirable fish or mussel species and/or diseases.

6.3.3 Other "work" unrelated to research (Avg. Score: 1.00)

NJ Specific Threats:

6.3.3.1 Construction projects may disrupt normal wildlife behavior which can result in reduced reproductive success or survival, abandonment of critical sites, etc. (e.g., bridge-nesting birds).

6.3.3.4 Workers may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.3.5 Unauthorized manipulation of water level (for dam repair, dredging, aquatic vegetation control, etc.) particularly during spawning season or during the summer when temperatures are high and dissolved oxygen is low can have negative impacts on fish and fish habitat.

7 Natural Systems Modifications

7.2 Dams and Water Management/Use

7.2.1 Abstraction of Surface Water (domestic use) (Avg. Score: 3.00)

NJ Specific Threats:

7.2.1.1 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.1.2 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.1.3 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, and eliminates shallow water habitats.

7.2.1.4 Water intake systems associated with municipal water supply threaten aquatic organisms due to injury or mortality from impingement and/or entrainment.

7.2.2 Abstraction of Surface Water (commercial use) (Avg. Score: 3.00)

NJ Specific Threats:

7.2.2.1 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, eliminates shallow water habitats, and disrupts/removes stream bottom habitat.

7.2.2.2 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.2.3 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.2.4 Water intake systems associated with industrial use and power plants threaten aquatic organisms due to injury or mortality from impingement and/or entrainment.

7.2.3 Abstraction of Surface Water (agricultural use) (Avg. Score: 3.00)

NJ Specific Threats:

7.2.3.1 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.3.2 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, and eliminates shallow water habitats.

7.2.3.4 Water intake systems associated with agriculture threaten aquatic organisms due to injury or mortality from impingement and/or entrainment.

7.2.3.5 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.5 Abstraction of Ground Water (domestic use) (Avg. Score: 3.00)

NJ Specific Threats: 7.2.5.1 Heavy withdrawal of ground water for domestic use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.6 Abstraction of Ground Water (commercial use) (Avg. Score: 3.00)

NJ Specific Threats: 7.2.6.1 Heavy withdrawal of ground water for industrial and commercial use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.7 Abstraction of Ground Water (agricultural use) (Avg. Score: 3.00)

NJ Specific Threats: 7.2.7.1 Heavy withdrawal of ground water for agricultural use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.9 Small Dams (Avg. Score: 2.00)

NJ Specific Threats: 7.2.9.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.9.2 Dams act as a barrier to fish movement, limiting the distribution of anadromous fish and fish that act as hosts for mussels.

7.2.9.3 Dams act as a barrier to movement, limiting the ability of aquatic or semi-aquatic wildlife to move safely between habitats.

7.2.10 Large Dams (Avg. Score: 3.00)

NJ Specific Threats: 7.2.10.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.10.2 Dams act as a barrier to fish movement, limiting the distribution of anadromous fish and fish that act as hosts for mussels.

7.2.10.3 Dams act as a barrier to movement, limiting the ability of aquatic or semi-aquatic wildlife to move safely between habitats.

7.2.11 Dams (size unknown) (Avg. Score: 2.00)

NJ Specific Threats: 7.2.11.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.11.2 Dams act as a barrier to fish movement, limiting the distribution of anadromous fish and fish that act as hosts for mussels.

7.2.11.3 Dams act as a barrier to movement, limiting the ability of aquatic or semi-aquatic wildlife to move safely between habitats.

7.2.12 Culverts (Avg. Score: 2.00)

NJ Specific Threats: 7.2.12.1 Improper design, placement, installation and maintenance of culverts and other stream crossing structures can impede or prevent the movements of terrestrial organisms and can restrict or limit stream flow, impeding the movement of aquatic organisms along riparian corridors.

7.2.13 Stream Burial (Avg. Score: 3.00)

NJ Specific Threats: 7.2.13.1 Eliminates riparian habitats.

7.2.13.2 Eliminates in-stream habitat and water resources for wildlife.

7.2.13.3 Alters the hydrology and quality of downstream aquatic and riparian habitats.

7.3 Other Ecosystem Modifications

7.3.1 Shoreline Stabilization (Avg. Score: 1.00)

NJ Specific Threats: 7.3.1.2 Efforts to stabilize stream corridors, particularly near roads and infrastructure, in which vegetated and dynamic shorelines are replaced with unvegetated and rigid structures such as rip-rap, gabion, concrete raceways and bulkheads interfere with fish spawning, nursery and foraging areas.

7.3.3 Removal of coarse woody debris (streams, forests, scrub-shrub habitats) (Avg. Score: 3.00)

NJ Specific Threats: 7.3.3.1 Decreases the available detritus that normally accumulates behind and within stream obstructions, minimizing or eliminating food sources and shelters for fishes, invertebrates and amphibians.

7.3.3.2 Decreases habitat and/or corridor suitability due to limited or absent shelter and foraging habitat.

7.3.3.4 Decreases available basking, shelter, and foraging habitats.

7.3.5 Poor habitat management (Avg. Score: 2.00)

NJ Specific Threats: 7.3.5.2 Shifting from natural vegetation to lawns can cause increased temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

7.3.5.4 Vegetation clearing or inappropriate alteration adjacent to aquatic habitats threatens aquatic species by degrading habitat and water quality (altering temperature and dissolved oxygen, increasing siltation and desiccation, etc.).

7.3.5.8 Storm water outfall pipes can create habitats in small streams that are conducive to non-native predatory fish which can negatively impact native fish species.

7.3.5.9 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, eliminates shallow water habitats, and disrupts/removes stream bottom habitat.

7.3.5.10 Ditching, draining and filling of marshes and wetlands eliminates habitat and degrades the remaining surrounding areas for wildlife.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species (Avg. Score: 3.00)

NJ Specific Threats: 8.1.1.1 Displace or outcompete native species for resources.

8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.

8.1.1.3 Invasive, non-native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

8.1.1.4 Invasive, non-native animals increase the risk of predation on native animals and/or herbivory on native vegetation.

8.1.2 Invasive non-native aquatic animals (Avg. Score: 3.00)

NJ Specific Threats: 8.1.2.2 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminishing habitat suitability and reducing ecological integrity of natural communities, and may introduce disease into a population.

8.1.3 Invasive non-native aquatic plants (Avg. Score: 1.00)

NJ Specific Threats: 8.1.3.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.4 Invasive non-native terrestrial/wetland animals (Avg. Score: 3.00)

NJ Specific Threats: 8.1.4.1 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.6 Invasive non-native fungal/bacterial diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.1.6.1 The introduction of non-native fungal and bacterial diseases threatens native populations and ecosystems.

8.2 Problematic Native Species/Diseases

8.2.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.2.1.3 Invasive, native species can out-compete non-invasive species for resources (food, light, shelter), leading to the demise of some species populations.

8.2.1.4 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.2.2 Named Species (Avg. Score: 1.00)

NJ Specific Threats: 8.2.2.2 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.3 Introduced Genetic Material

8.3.0 Introduced Genetic Material (Avg. Score: 3.00)

NJ Specific Threats: 8.3.0.1 Introduction of farm-reared species (e.g., bobwhite and brook trout) for hunting and fishing purposes introduces genetic material into the native population when species hybridize.

8.3.0.2 Species hybridizing as a result of the alteration of, and subsequent connectivity of, habitats that once separated species.

8.4 Problematic Species/Diseases of Unknown Origin

8.4.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.4.1.1 Non-native or poorly understood diseases and parasites could potentially impact native animals.

8.5 Viral/Prion-induced Diseases

8.5.2 Named Species (Disease) (Avg. Score: 3.00)

NJ Specific Threats: 8.5.2.2 Viral Hemorrhagic Septicemia (VHS) (recently introduced into the Great Lakes) has caused mortality in 30 common fish species across many families. Although many of the fish SGCN have not been tested, it is hypothesized that they may be vulnerable. If introduced into NJ, VHS is predicted to cause widespread fish kills.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.1 Domestic and Urban Waste Water

9.1.1 Sewage (Avg. Score: 2.00)

NJ Specific Threats: 9.1.1.1 Degradation of aquatic and marine water quality and habitats by changing turbidity, flow and water chemistry.

9.1.1.2 Leads to increased eutrophication and algae blooms that result in oxygen depletion.

9.1.1.3 Contaminants in sewage treatment effluents and Combined Sewer Overflows can cause developmental and behavioral abnormalities and reproductive failure in wildlife.

9.1.2 Run-off (Avg. Score: 3.00)

NJ Specific Threats: 9.1.2.1 Chemical fertilizers and nutrient run-off changes the pH in streams and ponds and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.1.2.2 Contaminants degrade aquatic and marine water quality and can bioaccumulate in benthic organisms, threatening wildlife by causing developmental and behavioral abnormalities and reproductive failure.

9.1.2.3 Contaminants from road runoff (oil, sediment, salt, etc.) impact native vegetation and the species that rely upon them, degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2 Industrial and Military Effluents

9.2.1 Oil Spills (Avg. Score: 3.00)

NJ Specific Threats: 9.2.1.1 Oil spills render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.1.2 Oil spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.1.3 Oil spills cause external oiling of wildlife and ingestion of oil, both of which can injure or kill wildlife.

9.2.2 Seepage from Mining (Avg. Score: 1.00)

NJ Specific Threats: 9.2.2.1 Contaminants from mining degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2.3 Other (Avg. Score: 2.00)

NJ Specific Threats: 9.2.3.1 Point and nonpoint source pollution such as polychlorinated biphenyls (PCBs), pesticides, heavy metals, and endocrine disrupting compounds (EDC's) into freshwater and marine systems pose threats to wildlife through direct contact and/or ingestion, and to aquatic species and their predators through bioaccumulation, impacting the reproductive success and neurological function of many avian and fish species.

9.2.3.2 Chemical spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.3.3 Chemical spills may render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.4 Other: Hydrofracturing (Avg. Score: 1.00)

NJ Specific Threats: 9.2.4.1 Contaminants from hydrofracturing degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2.4.2 Uncontrolled effluents escaping from hydrofracturing facilities can cause injury to wildlife and alter normal behaviors.

9.2.5 Other: Industrial toxic settling ponds (Avg. Score: 1.00)

NJ Specific Threats: 9.2.5.1 Surficial or open industrial effluent ponds can cause injury or death to wildlife that become exposed through ingestion or submersion.

9.3 Agricultural and Forestry Effluents

9.3.1 Nutrient Loads (Avg. Score: 3.00)

NJ Specific Threats: 9.3.1.1 Chemical fertilizers and nutrient run-off changes the pH in streams, ponds and wetlands and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.3.1.2 Animal waste degrades terrestrial and aquatic habitats, especially streams, ponds and wetlands, resulting in eutrophication, which disrupts oxygen and nutrient balances, and causes injury and mortality to aquatic organisms.

9.3.1.4 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades wetland and aquatic habitats with runoff, increasing sediment and nutrient loads and pH.

9.3.1.5 Conversion of native forests to plantations degrades wetland and aquatic habitats through increased runoff.

9.3.2 Soil Erosion and Sedimentation (Avg. Score: 3.00)

NJ Specific Threats: 9.3.2.1 Soil erosion, sedimentation and destruction of streambanks and riparian buffers degrade waters making them unsuitable for riparian-dependent wildlife.

9.3.2.3 Conversion of native forests to plantations degrades wetland and aquatic habitats through increased sedimentation.

9.3.3 Herbicides and Pesticides (Avg. Score: 2.00)

NJ Specific Threats: 9.3.3.1 Pesticides degrade terrestrial and aquatic habitats, especially streams, ponds and wetlands. Aquatic wildlife are particularly sensitive to these contaminants, which can cause developmental and behavioral abnormalities and reproductive failure. Some contaminants may bioaccumulate in predatory fish and birds and disrupt reproduction.

9.3.3.3 Use of pesticides can directly harm non-target species through direct contact and/or by reducing and/or contaminating their food supply.

9.3.4 Other (Avg. Score: 2.00)

NJ Specific Threats: 9.3.4.1 Spills, leaks or discharges of fuel, oil or other contaminant fluids from machinery or equipment used in the normal course of agricultural or forestry activities can degrade or destroy adjacent aquatic and terrestrial habitats and/or cause harm to non-target species (plants and animals).

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture (Avg. Score: 2.00)

NJ Specific Threats: 9.3.5.1 Use of pesticides, insecticides, and/or herbicides can directly harm non-target species, such as amphibians and beneficial invertebrates through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5.4 Improper use of current insecticides, such as those containing esfenvalerate, prallethrin, or piperonyl butoxide, or past use of pesticides containing chlordane still present in the soils, are toxic to various wildlife species, and can cause injury, mortality, or other effects that impair population viability.

9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.4 Garbage and Solid Waste

9.4.1 Direct hazards to wildlife (Avg. Score: 1.00)

NJ Specific Threats: 9.4.1.2 Garbage and solid waste destroys natural habitats and obstructs wildlife movements.

9.5 Air-Bourne Pollutants

9.5.1 Acid Rain (Avg. Score: 1.00)

NJ Specific Threats: 9.5.1.1 Causes acidification of water bodies, resulting in changes to aquatic and marine communities and reducing biodiversity, and creating conditions that are unsuitable for some aquatic (freshwater and marine) and semi-aquatic species that are sensitive to pH shifts.

9.5.1.2 Leaches calcium from the soils which in turn reduces the availability of prey, particularly calcium-rich prey such as snails.

9.5.4 Other (Avg. Score: 1.00)

NJ Specific Threats: 9.5.4.1 Dust and/or airborne sedimentation from construction sites, agricultural operations or related earth disturbances can introduce mineral or organic sediments into adjacent wildlife habitats, degrading their quality and suitability for wildlife short-term and/or long-term.

9.5.6 Herbicides and Pesticides (Avg. Score: 2.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

9.6 Excess Energy

9.6.2 Thermal Pollution (Avg. Score: 3.00)

NJ Specific Threats: 9.6.2.1 Water temperature changes due to industrial discharge of heated water may impact species composition in the receiving waterbody. Species such as sea turtles and migrating fish may be attracted to the thermal plume and become more vulnerable to mortality during emergency shutdowns during cooler months.

9.6.2.2 Water temperature changes to aquatic systems can deter or preclude use by SGCN (e.g., alter habitat suitability for wildlife species, reduce prey base) or present stressors that are harmful if not fatal to wildlife.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 3.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.2 Droughts

11.2.1 Droughts (Avg. Score: 3.00)

NJ Specific Threats: 11.2.1.1 Contribute to hardened soils, decreasing water recharge during rains and increasing the likelihood of flash floods during storms.

11.2.1.2 Lead to lower groundwater levels and therefore, less available water for people and habitats.

11.2.1.3 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

11.2.1.4 Increase stress on vegetation making them more susceptible to pest damage.

11.3 Temperature Extremes

11.3.1 Temperature extremes (Avg. Score: 3.00)

NJ Specific Threats: 11.3.1.1 Increasing temperatures may cause habitat loss and degradation by desiccating and/or raising the temperatures of small wetlands and streams leading to the loss of freshwater mussels and other aquatic species and species reliant upon these habitats.

11.3.1.2 Increased temperatures can negatively impact wetland, riverine, lacustrine and vernal pool-associated or -dependent wildlife by reducing flows, increasing water temperatures, lowering water levels and causing premature drying of vernal habitats.

11.4 Storms and Flooding

11.4.1 Storms and flooding (Avg. Score: 2.00)

NJ Specific Threats: 11.4.1.1 Extreme storms and flooding events threaten aquatic and marine wildlife through habitat degradation and alteration, including alterations to off-shore or back-bay benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic and marine wildlife.

11.4.1.4 Flood events alter river or stream morphology, benthic conditions and habitat availability for wildlife, cause bank erosion, and deposit sediments in floodplain wetlands altering wildlife habitat.

11.4.2 Increased rainfall (Avg. Score: 2.00)

NJ Specific Threats: 11.4.2.1 Extreme rain events threaten aquatic wildlife through habitat degradation and alteration, including alterations to benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic wildlife.

11.6 Phenology Shifting or Alteration

11.6.2 Phenology shifts related to predator-prey ecology (Avg. Score: 1.00)

NJ Specific Threats: 11.6.2.1 Alters inter-specific relationships (e.g., competition, parasitism, predation) of wildlife, ultimately leads to detrimental impacts on the ecological system.

11.6.2.2 Shifts timing of species migration, breeding and hibernation, and available food resources, causes redistribution of species, or mortality for species that are unable to relocate due to their already isolated habitat or limited mobility.

11.6.3 Phenology shifts related to species redistribution (Avg. Score: 3.00)

NJ Specific Threats: 11.6.3.1 Shifts in timing of species migration, breeding and hibernation, and available food resources, as a result of wildlife range shifts driven by climate change.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 1.00)

NJ Specific Threats: 12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.2 Lack of up-to-date existing information (Avg. Score: 1.00)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.3 Need to answer research question (Avg. Score: 1.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 1.00)

NJ Specific Threats: 12.3.0.2 Delays between State species status reviews and regulation amendments to incorporate the findings leads to extended periods when imperiled species do not receive the benefit of land use and other regulatory protections.

12.3.0.5 NJDEP land use regulations provide no protection for spawning habitats of native, freshwater fish that are identified as candidates for State endangered, threatened, or special concern status.

12.3.0.6 Certain geographic or habitat features, such as vernal pools and headwater wetlands or streams, may be too small, mischaracterized, or misidentified to benefit from regulatory protection.

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 1.00)

NJ Specific Threats: 12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 2.00)

NJ Specific Threats:

14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 2.00)

NJ Specific Threats:

14.2.1.2 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various aquatic and riparian management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 1.00)

NJ Specific Threats:

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.4 Secure and promote the protection, restoration, and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts through incentive programs.

1.2.1.5 Secure and promote the protection/restoration of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through incentive programs.

1.2.1.6 Secure and promote the protection/restoration of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers through incentive programs.

1.2.1.7 Secure and promote the protection/restoration of fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.9 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing Forestry Stewardship Programs.

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.12 Create incentives (non-monetary and/or monetary) for land developers to redevelop abandoned areas (e.g., shopping centers, office complexes) to minimize the loss of natural habitats and reduce the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.14 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of herbicides and pesticides, and implementing more ecologically safe strategies when using such products.

1.2.1.16 Create incentives (non-monetary and/or monetary) within State regulations (mitigations requirements or credit, BMP satisfaction, etc.) to promote the use of retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.17 Develop a public-relations oriented certification program for private retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.18 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and land managers to control and reduce the impacts of invasive, native and non-native species in order to increase structural habitat diversity.

1.2.1.22 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to horse/livestock farm owners and managers to increase structural habitat diversity in and around the farms by managing vegetation for a variety of species, in particular, farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

1.2.1.23 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to provide cost shares and/or plan approvals for management based on management approaches and prescriptions.

1.2.1.25 Create incentives (non-monetary and/or monetary) within State regulations to assist and programs to deliver those incentives to aquaculture growers to relocate, for example, from intertidal to subtidal lease areas through buyouts of leases or microloans, and/or promoting on-lease conservation measures used by aquaculture growers (such as the implementation of conservation easements, use of living shorelines, incorporation of BMPs for habitat protection, etc.) for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

2 Direct Management of Natural Resources

2.2 Dam and barrier removal

2.2.1 Culvert work

2.2.1.1 Replace existing barriers to wildlife movement with and/or install appropriately-sized systems to accommodate wildlife dispersal.

2.2.5 Obstruction removal

2.2.5.1 Enhance fish SGCN habitats by removing obstructions to fish passage to benefit those species.

2.6 Hazard or infrastructure removal

2.6.6 Shoreline armoring removal

2.6.6.1 Remove shoreline armoring to reduce its impacts on aquatic habitats.

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.1 Control invasive insect infestations by implementing BMP strategies through biological, chemical and/or mechanical means that will depress, or when appropriate, eradicate populations in a manner that avoids excessive harm to non-target species using BMPs to control infestations and limit their spread based on an inventory of invasive insect distribution and response to outbreaks.

2.8.0.2 Develop, implement, monitor and evaluate pest control/management strategies to reduce the impacts of over-abundant wildlife species (native and/or native, invasive species) on native vegetation and the degradation of habitats supporting SGCN. Over-abundant wildlife species include but are not limited to mute swans, Canada geese, beaver and white-tailed deer.

2.8.0.3 Work with NJ Invasive Species Strike Team to identify areas with and eradicate aquatic invasive species such as the Asian Swamp Eel, Northern Snakehead, and the Chinese pond mussel. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.5 Implement biologically safe and appropriate control/management strategies, and where appropriate, eradication strategies to reduce the impacts and/or limit the distribution of invasive and/or non-native plant species within or near aquatic systems using methods that will provide the most protection to the aquatic and riparian ecological system, and minimize disturbance to the soil and wildlife. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.8.0.6 Implement long-term management of invasive and/or non-native plants to help maintain functioning ecological systems and biological diversity, and to enhance travel corridors. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.9 Living shorelines

2.9.2 Erosion control structures

2.9.2.1 Install breakwaters in the form of living shorelines to reduce the impact of wave erosion while preserving the natural character of the site.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.3 Restore and/or enhance habitats to benefit urban-associated SGCN.

2.10.0.4 Restore and/or enhance suitable travel corridors connecting conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.8 Protect significant natural and/or unique communities by implementing best management practices when conducting habitat restoration strategies.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.12 Create and/or maintain scrub-shrub habitats through revegetation efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.10.0.13 Restore and/or enhance impoundments to provide suitable foraging and nesting habitat for SGCN species inhabiting them (e.g., bitterns, rails, ducks, turtles and some invertebrates).

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.17 Maintain, enhance and/or restore SGCN-inhabited/used freshwater wetlands through restoring submerged aquatic vegetation.

2.10.0.18 Implement a habitat improvement and restoration program to restore cold-water fish habitat, ecosystems and populations.

2.10.0.21 Restore and/or enhance understory habitats that suppress invasive species and provide critical resources and enhance sheltering, foraging, and nesting cover for wildlife.

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.10.0.24 Use NJ's CHANJ mapping and guidance to establish vegetation and enhance or create corridors between fragmented habitats with similar vegetation, slope, soils, structure, etc. to ensure vegetative integrity is maintained to allow wildlife to safely disperse, and corridors are buffered with natural habitats to minimize disturbance to wildlife within the corridors.

2.10.0.25 Enhance SGCN fish habitats through aquatic and riparian vegetation restoration.

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through vegetation management.

2.11.0.6 Reclaim degraded rare species habitats by conducting vegetation management needed to restore habitat value for the documented/target SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.8 Maintain, enhance and/or restore biologically appropriate buffers for SGCN-inhabited/used freshwater wetlands through vegetation management.

2.11.0.13 Implement best management practices (BMPs), protective strategies, and guidelines for vegetation management to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.11.0.15 Implement vegetation management to benefit urban-associated SGCN.

2.11.0.16 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.11.0.18 Implement forest management/silvicultural strategies that promote the development of new old-growth forests and/or minimize the loss of old-growth forest stands with large trees and within large, contiguous tracts.

2.11.0.19 Implement forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN.

2.11.0.21 Minimize the degradation, alteration and/or changes in hydrology of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and subsequent disturbances to and behavioral changes of wildlife by maintaining or enhancing these areas and biologically appropriate buffers through habitat management and/or revegetation or restoration efforts.

2.11.0.22 Minimize habitat loss of high and low marsh habitats that provide nesting, migrating and wintering areas for SGCN birds and other marsh-dependent SGCN by maintaining or enhancing these areas through habitat management and/or revegetation or restoration efforts.

2.11.0.24 Conduct vegetation management adjacent to aquatic habitats following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.25 Conduct vegetation management along access roads following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.27 Conduct vegetation management for target shrub- or young forest-dependent SGCN following BMPs to minimize the risk of the establishment of invasive and non-native plants.

2.11.0.28 Conduct vegetation management in agricultural areas following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.29 Conduct vegetation management on transportation and service corridors (i.e., rights-of-way) following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.33 Increase structural habitat diversity by implementing long-term vegetation management to minimize the potential for the establishment of invasive and/or non-native plants that may outcompete native vegetation.

2.11.0.34 Increase structural habitat diversity by managing residential, commercial and recreational areas' landscapes for a variety of species. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.35 Increase structural habitat diversity by managing vegetation adjacent to aquatic habitats in a manner that provides a buffer from runoff and erosion and a microclimate to stabilize seasonal temperatures to benefit a variety of aquatic and semi-aquatic species.

2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.

2.11.0.37 Increase structural habitat diversity by minimizing the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats which benefits wildlife.

2.11.0.38 Increase structural habitat diversity in and around horse/livestock farms by managing vegetation for a variety of species, in particular, in and around farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

2.11.0.43 Manage forests to increase variation in age structure and composition using BMPs that promote and maintain functioning ecological forest-based systems and biological diversity.

2.12 Water management

2.12.1 Ditch plugs

2.12.1.1 Implement best management practices (BMPs), protective strategies, and guidelines for ditch plugging to maintain and enhance healthy, resident and migratory SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.12.2 Diversion/headgate

2.12.2.1 Prevent or ameliorate near-term impacts of climate change throughout the State but in particular within the coastal and Delaware Bay areas by implementing habitat management strategies that will establish/improve habitat resilience, such as using diversions, that benefits wildlife inhabiting these areas.

2.12.3 Drainage

2.12.3.1 Remove drainage ditches to benefit urban-associated SGCN.

2.12.3.2 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) such as removing drainage ditches to restore natural stream flows and wetlands, that benefit wildlife inhabiting these areas.

2.12.3.3 Remove tile drains and drainage ditches to improve wetland hydrology and restore natural stream flows during appropriate times to avoid sensitive periods (e.g., nesting, denning, roosting) and minimizes harm to wildlife, particularly SGCN.

2.12.3.4 Expand the acreages and enhance the effective size of SGCN habitats by reclaiming/restoring adjacent, degraded habitats by removing tile drains and drainage ditches.

2.12.3.6 Protect significant natural and/or unique communities by and when removing tile drains and drainage ditches.

2.12.3.11 Implement best management practices (BMPs), protective strategies, and guidelines when removing tile drains and drainage ditches to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.12.5 Spring development

2.12.5.1 Implement a habitat improvement and restoration program to restore cold-water fish habitat, ecosystems and populations.

2.12.7 Waterfowl impoundment maintenance

2.12.7.1 Manage impoundments to benefit SGCN species inhabiting them (e.g., bitterns, rails, ducks, turtles and some invertebrates).

2.12.7.3 Implement best management practices (BMPs), protective strategies, and guidelines for impoundment management to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.12.7.4 Implement impoundment management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimizes harm to wildlife, particularly SGCN.

2.12.7.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through impoundment management.

2.12.7.6 Reclaim degraded rare species habitats through impoundment management needed to restore habitat value for the documented/target SGCN.

2.12.7.7 Protect significant natural and/or unique communities by implementing best management practices for impoundment management.

2.12.7.8 Repair impoundments damaged by salt hay farm/dike abandonment and conduct restoration of degraded sites for targeted SGCN species and their habitats.

2.12.7.14 Prevent or ameliorate near-term impacts of climate change throughout the State but in particular within the coastal and Delaware Bay areas by implementing habitat management strategies that will establish/improve habitat resilience, such as impoundment management, that benefits wildlife inhabiting these areas.

2.13 Wildlife damage management

2.13.0 Nuisance fish and wildlife damage

2.13.0.1 Investigate the impacts of mosquito control methods on predator SGCN (bats, insectivorous birds). Develop, implement and evaluate the effectiveness of mosquito control-BMPs designed to avoid depletion or contamination of SGCN's insect prey base and drinking sources with pyrethroids, organophosphates, or other chemicals.

2.13.0.4 Investigate the effects of mosquito control methods on freshwater aquatic and semi-aquatic SGCN including but not limited to, amphibian, fish, dragonfly, and damselfly populations.

2.13.0.5 Investigate the impacts of human-subsidized and/or naturally occurring predator species on SGCN to assess the need for integrated wildlife damage management techniques (e.g., predator exclosures, fish blockages, electric fence, culls) and/or policy changes on state land management that minimize the impacts of human-subsidized predators.

2.13.0.8 Implement and assess management strategies to control and reduce the impacts of detrimental species and diseases that pose threats to native wildlife or communities.

2.14 Wildlife disease management

2.14.0 Wildlife disease strategy development and investigation

2.14.0.1 Investigate diseases/pathogens impacting SGCN and/or their habitats.

2.14.0.2 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

2.14.0.3 Protect SGCN from exotic pathogen introduction or incident through implementation of a "rapid response plan"; DFW to give priority attention to these species in planning and/or implementing a response.

2.14.0.4 Conduct long-term monitoring of diseases in vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts.

2.14.0.5 Assess the impacts of diseases on the life cycles of wildlife.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.6 Conduct long-term studies on resident and migratory SGCN to determine if there are changes to the populations' demography (productivity, survival, dispersal) and/or to their critical and/or supporting habitats (i.e., diminishing in value, acreage or connectivity, etc.), in particular changes that would not maintain SGCN at viable levels for species populations. Update data and GIS maps; provide updated information to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.11 Develop, implement and evaluate the effectiveness of town plans that avoid impacts to SGCN species and their habitats.

3.0.0.12 Compile available life history information on urban-associated SGCN (e.g., predators, levels of nest/young depredation, breeding longevity and reproductive effort over time, preferred nesting/reproductive requirements, fidelity to breeding and wintering sites, comprehensive assessment of migration routes and destinations) for future development of management strategies to benefit such species.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.14 Identify areas with invasive, aquatic plants and animals and collect a detailed baseline assessment of the species' status and distribution. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort. Researchers and contractors performing Forest Stewardship Inventories and/or Plans on state lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.0.0.15 Conduct long-term monitoring of areas identified as having invasive, aquatic plants and animals to track the species' status/progress over time with or without the implementation of management strategies. Areas without management strategies should be assessed and prioritized for management/control. Areas where management strategies are being implemented should include an assessment of the management effort and identify/recommend and implement necessary changes to improve its success. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort.

3.0.0.19 Identify the presence and status (e.g., functioning, structure, slated for removal, etc.) of existing dams and culverts within and/or that may impact SGCN and their habitats, and create a database that includes a GIS component identifying the locations of such structures and their status. Share this information with appropriate organizations and/or agencies evaluating the benefits and risks of such structures on SGCN and their habitats.

3.0.0.20 Once baseline data identifying and describing the status of existing dams and culverts have been gathered, conduct evaluations at a variety of sites to determine whether the benefits of culvert and dam creation or removal outweigh the risks to SGCN species and their habitats, and if other variables/conditions specific to individual sites/locations result in a different outcome. Identify and target appropriate dams and culverts for removal and/or reconstruction to minimize harm to SGCN species and their habitats.

3.0.0.22 Develop, implement and evaluate the success of a habitat improvement and restoration program to restore cold-water fish habitat, ecosystems and populations.

3.0.0.23 Identify (through wildlife and aquatic system surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and research water quality parameters for all [types of] aquatic systems for various SGCN populations.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.2 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.0.3 Survey for and monitor populations of freshwater aquatic focal SGCN to assess the populations' demography, trends, condition, distribution, etc.

3.2.0.4 Conduct long-term monitoring of the impacts of contaminants to vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.2.0.7 Track (via a database that includes a GIS component) and research problematic species and diseases to determine their distribution, impacts on SGCN wildlife/wildlife communities, and develop potential control measures.

3.2.0.8 Implement and conduct long-term monitoring of control measures aimed at minimizing the impacts of problematic species and/or diseases to evaluate the effectiveness of such efforts and to identify and incorporate additional strategies as appropriate.

3.2.0.9 Maintain an inventory of invasive insect distribution and where they exist, conduct long-term monitoring of habitat conditions to assist in developing strategies to combat the impacts to SGCN habitats. Report potential infestations to NJ DEP.

3.2.0.10 Evaluate the effectiveness of sanitation/decontamination protocols in minimizing the transference of wildlife diseases and invasive plant species.

3.2.0.15 Identify and compile information regarding critical time periods in which freshwater SGCN fish are vulnerable (e.g., spawning periods) using literature searches, review of available data, enlistment of species experts, etc.).

3.2.0.18 Conduct baseline surveys/inventories to better understand the distribution of fish and invertebrate (including freshwater mussels) populations.

3.2.0.21 Investigate the effects of mosquito control methods on freshwater aquatic and semi-aquatic SGCN including but not limited to, amphibian, fish, dragonfly, and damselfly populations.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.2 Age, size and sex structure

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.3 Baseline inventory

3.2.3.4 Establish population estimates and trends for all managed fish species.

3.2.3.6 Investigate the feasibility and potential for success of conducting genetic rescue through translocation and/or reintroduction of animals into suitable habitat that was historically occupied to increase genetic diversity and reconnect isolated populations. Methods of investigation should include, but are not limited to, thorough literature reviews, expert opinions, identifying potential pitfalls (e.g., species' fidelity to their range or critical areas), and an examination of historic and current SGCN population distribution and suitable habitat availability.

3.2.5 Genetics

3.2.5.1 Investigate the feasibility and potential for success of conducting genetic rescue through translocation and/or reintroduction of animals into suitable habitat that was historically occupied to increase genetic diversity and reconnect isolated populations. Methods of investigation should include, but are not limited to, thorough literature reviews, expert opinions, identifying potential pitfalls (e.g., species' fidelity to their range or critical areas), and an examination of historic and current SGCN population distribution and suitable habitat availability.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.6 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) that could, through revegetation and/or enhancement efforts, become suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN.

3.3.1.7 Map and prioritize existing and potential areas for early succession forest management. Share the results with state, county and municipal planners.

3.3.1.10 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and document fish SGCN habitats by plotting their distributions in GIS and submitting the data to the State for integration into the DEP's Biotics database.

3.3.1.11 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the quality and importance of areas with submerged aquatic vegetation to benefit waterfowl, finfish, and shellfish species.

3.3.1.16 Gather "best information" for spatial modeling and update/create a current model/depiction of anticipated habitat shifts from sea-level rise, flooding, etc.

3.3.1.18 Conduct an assessment using available data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels.

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.1.26 Survey all historic locations and unsurveyed suitable habitats to identify populations of freshwater aquatic focal species.

3.3.1.27 Develop a matrix that lists every commercial and recreational fishery and aquaculture facility that operates in state waters and for each fishery listed, provide details regarding their fishing seasons, gear descriptions, locations and number of fishers. Add a GIS component to overlay species of concern and sensitive areas.

3.3.2 Monitoring

3.3.2.1 Evaluate the effectiveness of forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.4 Protect water quality and aquatic-dependent species by appropriately designating Category 1 waters and enforcing protective regulations. Seek appropriate classifications for stream segments based on Endangered and Threatened Status and/or the Index of Biotic Integrity (IBI) results that do not fulfill Category One requirements.

3.3.2.5 Conduct long-term monitoring of water quality of SGCN aquatic habitats (and aquatic systems feeding into those habitats) to evaluate protection and management efforts to reduce, if not eliminate, chemical contamination, siltation, eutrophication, and other forms of pollution/contamination of aquatic systems.

3.3.2.7 Conduct studies on land use practices such as ditching, impounding, dredging, open marsh water management, burning, and marsh restoration to evaluate the effectiveness and potential impacts on marsh-dependent SGCN.

3.3.2.14 Research and evaluate the effectiveness of water quality management practices on water-dependent and semi-dependent SGCN, particularly those practices associated with permitting or mitigation actions.

3.3.2.15 Investigate the effectiveness of management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.3.2.20 Once a system is developed for reporting and qualifying new locations of invasive species, develop, implement and monitor/evaluate invasive species removal strategies at identified locations. Priority should be given to those areas critical to SGCN and/or contain unique and/or rare plant communities supporting SGCN and/or other fish/wildlife species.

3.5 Techniques development

3.5.1 Artificial propagation studies

3.5.1.1 Conduct studies to evaluate the impacts (beneficial and detrimental) of aquaculture on migratory shorebirds, waterfowl, finfish, shellfish and other SGCN and their habitats, including evaluation of the relative effects of location and aquaculture techniques.

3.5.1.2 Develop and conduct studies that evaluate relative efficacy and feasibility of management actions designed to minimize adverse impacts and enhance beneficial effects.

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.7 Develop/improve forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

3.5.3.8 Develop best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5.3.9 Develop strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

3.5.3.10 Develop a habitat improvement and restoration program to restore cold-water fish habitat.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.12 Develop management actions to minimize the documented adverse impacts and reduce risks of potential adverse impacts of aquaculture on migratory shorebirds and other SGCN, including waterfowl, finfish, and shellfish and their habitats.

3.5.3.14 Develop aquaculture practices in the coastal areas that are compatible with the recovery of SGCN.

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.3.20 Develop guidance on various silviculture techniques for enhancing forests for forest-dependent SGCN.

3.5.3.22 Identify (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) and modify management strategies (e.g., timing restrictions for mowing, cooperative agreements with utility companies for maintenance of rights-of-ways), based on research, that maintain and enhance large existing areas of grassland in perpetuity.

3.5.3.23 Revise water quality management practices based on research on water-dependent and semi-dependent SGCN, particularly when associated with permitting or mitigation actions.

3.5.3.24 Based on research, modify management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.3.27 Conduct an assessment and develop a location list of available equipment for boom deployment during oil spills.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.2 Develop, implement, monitor and evaluate management strategies to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

3.5.4.4 Investigate the effects of mosquito control methods on freshwater aquatic and semi-aquatic SGCN including but not limited to, amphibian, fish, dragonfly, and damselfly populations.

3.5.4.5 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

3.5.4.6 Investigate the feasibility of mitigating for the impacts of contaminants to vulnerable wildlife, particularly SGCN. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.5.4.7 Investigate the feasibility and potential for success of conducting genetic rescue through translocation and/or reintroduction of animals into suitable habitat that was historically occupied to increase genetic diversity and reconnect isolated populations. Methods of investigation should include, but are not limited to, thorough literature reviews, expert opinions, identifying potential pitfalls (e.g., species' fidelity to their range or critical areas), and an examination of historic and current SGCN population distribution and suitable habitat availability.

3.5.4.8 Develop a habitat improvement and restoration program to restore cold-water fish ecosystems and populations.

3.5.4.12 Investigate and develop strategies to reduce "by-catch" of SGCN and other non-target species. Present findings and strategies to NJ DEP and conservation organizations for review and possible implementation. Develop a database documenting by-catch for use in management planning decisions.

3.5.4.14 Develop and implement agreements, and update existing agreements, with government agencies regarding the protection of critical SGCN habitats (e.g., significant breeding populations of beach nesting birds, colonial waterbird nesting areas, bat colonies, etc.).

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.17 Investigate new, non-invasive techniques for SGCN population evaluation through literature review, expert opinion, trial studies (if low risk), etc.

3.5.4.18 Investigate the effectiveness of survey techniques through selected “ground truthing” and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

3.5.4.21 Develop BMPs to address problematic species and diseases of unknown origin.

4 Education

4.1 Educator/Instructor training

4.1.0 Public education

4.1.0.1 Provide educational resources and training programs to private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

4.1.1 Aquatic resource education

4.1.1.1 Provide educational resources and training programs to teachers in aquatic resource education that includes information regarding climate change and sea-level rise for incorporation into the class curriculum and/or as the focus of school field trips.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.3 Secure and protect riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.4 Secure and protect fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.6 Secure and protect old-growth forest stands with large trees and/or stands that are approaching or being actively managed for old growth forests, in particular those within large, contiguous forest tracts, through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.7 Secure and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.8 Secure and protect scrub-shrub habitats for SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.3 Increase the protection of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through conservation area designations.

6.3.0.4 Promote the protection of fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through conservation area designations.

6.3.0.6 Promote the protection of old-growth forest stands with large trees and/or stands that are approaching or being actively managed for old growth forests, in particular those within large, contiguous forest tracts, through conservation area designations.

6.3.0.7 Promote the protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through conservation area designations.

6.3.0.8 Promote the protection of scrub-shrub habitats for SGCN through conservation area designations.

7 Law Enforcement

7.1 Law enforcement

7.1.3 Sub-national Level

7.1.3.2 Increase the number of law enforcement officers tending to wildlife issues to a reasonable number to sufficiently cover the State and marine waters.

7.1.4 Scale Unspecified

7.1.4.1 Improve enforcement of policies and/or regulations that promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

7.1.4.3 Increase law enforcement presence proximate to sensitive areas [e.g., avian nesting sites, in particular rookeries, and reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively)] to deter human activity and subsequent disturbance to SGCN.

7.1.4.6 Recruit law enforcement to assist in the protection and enhancement of SGCN populations, in particular endangered species, through improved awareness of species through trainings, partnerships, and other methods. Information should include but is not limited to: 1) Issues concerning illegal collection of reptiles, 2) Persecution of rare snakes, 3) Illegal recreational activities on public lands (e.g., off-road vehicles) and their impact on wildlife, 4) Identification of sensitive areas, critical sites and/or "hot-spots" for collection.

7.1.4.9 Implement policies that improve and secure habitat connections between conserved SGCN habitats.

7.1.4.10 Implement policies that promotes expanding acreages and enhances the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.14 Implement policies that protect existing and developing old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

7.1.4.15 Implement policies that preserve and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

7.1.4.16 Implement policies that protect and restore riparian areas.

7.1.4.17 Improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

7.1.4.19 Implement policies that protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

7.1.4.20 Implement policies and/or regulations with the objective of reducing "by-catch" of SGCN and other non-target species.

7.1.4.26 Educate law enforcement personnel that there may be unauthorized research projects taking place and to encourage them to investigate any activities that appear to be harmful to wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.1 Coordinate research efforts among government agencies, non-government conservation partners and other stakeholders to investigate the impacts of aquaculture on migratory shorebirds, waterfowl, finfish, shellfish and other SGCN and their habitats, to determine relative effects of farming locations and aquaculture techniques, and to evaluate management actions to minimize such impacts.

8.1.0.2 Develop a team of personnel from government entities, conservation organizations and other stakeholders engaged in oil/gas spill response for marine and freshwater habitats to develop a feasible plan for oil spill response and/or to amend NJ's current oil spill response plan that clearly outlines each organizations responsibilities and an assessment and location list of available equipment for boom deployment during oil spills.

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.1.0.4 Engage government agencies, conservation partners and other stakeholders in constructive dialogues encouraging them to influence policy change and the creation of incentives through a habitat bill and/or municipal ordinances for backyard habitat.

8.1.0.8 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting sportsmen's organizations and fisheries addressing the potential effects of over-harvesting wildlife and promote "catch and release".

8.1.0.10 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting sportsmen's organizations and fisheries, as well as public constituents, addressing the potential impacts of over-harvesting wildlife can have on the ecological system and to promote "sustainable harvest".

8.1.0.13 Engage DOD in a constructive dialogue regarding strategies to minimize disturbances to all SGCN (i.e., beyond their federal requirements) from forest management and other practices on their lands.

8.1.0.14 Engage DOD in a constructive dialogue regarding strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities.

8.1.0.15 Engage government agencies, conservation partners and other stakeholders in discussions encouraging and supporting the creation of laws and policies requiring vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

8.1.0.16 Engage local governments in discussions regarding the importance of them adopting/passing ordinances which require assessing and addressing secondary impacts (i.e., ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

8.1.0.17 Engage municipalities in constructive dialogue to identify and minimize destruction of areas prioritized for early succession forest management.

8.1.0.18 Engage NJDOT, NJ Transit Authority and other road management entities, wildlife conservation organizations/agencies (e.g., Division of Fish and Wildlife, New Jersey Conservation Foundation, Conserve Wildlife Foundation of NJ), and communities and citizens in discussions regarding the importance of and methods to enhance habitat connectivity, and work together to develop feasible strategies for ensuring that wildlife can disperse naturally and safely across roads and similar barriers to terrestrial and/or aquatic habitats.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.26 Coordinate across federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to woodland landowners to adopt or endorse consistent best management practices concerning controlled burns to maintain and/or improve forested habitat for wildlife.

8.1.0.27 NJ Division of Fish and Wildlife and their Game Council, and appropriate conservation partners and other stakeholders to review the freshwater fish code relative to SGCN or sensitive game species' populations and fecundity, and support amendments to the harvest quota or "bag limits" as needed.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.32 Work with NJ DEP's Water Management, other state agencies and watershed organizations to determine if mitigation is warranted at applicable power plants.

8.1.0.33 Engage government agencies, conservation partners and other land managers, communities, landowners, and commercial and industrial stakeholders in discussions regarding the importance of protecting and methods to protect priority wetlands beyond the levels afforded through regulation by maintaining and/or restoring optimal biological buffers around wetlands.

8.1.0.34 Work with the NJ Education Association and Department of Education to design curriculum and outdoor experimental learning opportunities, and provide training to teachers on implementation of these activities.

8.1.0.37 Enlist landowners and NJ citizens in the protection of and survey efforts for SGCN, in particular rare species, by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management and wildlife-related volunteer programs.

8.1.0.38 Engage partners, stakeholders and land managers in constructive dialogue promoting forest stewardship for SGCN that use core forests and forested corridors.

8.1.0.40 Encourage researchers, land managers, naturalists and enthusiasts to follow proper procedures for the coordination and/or permitting of research/management activities involving wildlife and sensitive habitats, and discourage activities that alter vegetation or wetlands, or cause harm or disturbance to wildlife.

8.1.0.44 Engage conservation partners, stakeholders, government agencies and other land stewards in constructive dialogues encouraging their inclusion of controlled burns in forest and other stewardship plans.

8.1.0.46 Form cooperative partnerships with dredging companies to facilitate habitat creation and enhancement within project areas, and to identify seasonal timing of activities that would minimize impacts to wildlife and their habitats.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.1.0.48 Form cooperative partnerships with transportation and shipment agencies and companies to facilitate habitat creation and enhancement away from and outside of project areas and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.1.0.49 Reduce the impacts of entrainment, impingement and thermal discharge at power plants by working with conservation partners, academia, etc. to ensure that best available technologies are utilized wherever possible.

8.2 Recruitment and retention activities

8.2.3 For wildlife watching

8.2.3.1 Develop and implement nature-focused tourism opportunities including wildlife viewing sites, interpretive signage highlighting unique ecosystems/habitats, and wildlife-related recreational opportunities that do not negatively impact SGCN or their habitats.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.1 Utilize WSFR grant funds, in combination with alternate funding sources as needed, to implement a scientific data-driven, extensive educational/outreach program targeting sportsmen's organizations and fisheries, as well as public constituents, addressing the potential impacts of over-harvesting wildlife can have on the ecological system and to promote "sustainable harvest".

8.3.0.2 Utilize WSFR grant funds, in combination with alternate funding sources as needed, to implement an extensive educational/outreach program consisting of displays, fliers, list-serve mailings, Facebook posts and speaking engagements with sportsmen's organizations and fisheries, as well as public constituents, addressing the unintended effects fishing gear and tackle can have on non-target species.

8.3.0.3 Utilize WSFR grant funds, in combination with alternate funding sources as needed, to implement catch and release outreach program(s).

8.3.0.8 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate recreationists and encourage landowners to eliminate garbage in the vicinity of suitable wildlife habitat, in particular SGCN habitat. Information should include the detrimental impacts garbage may have on various wildlife species.

8.3.0.9 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners and land managers to include only native plants in landscaping and restoration projects. Provide information to assist them in detecting problematic establishment of invasive, non-indigenous plants.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.16 Develop an educational outreach program using a variety of media to ensure maximizing the distribution of information, in particular targeting sportsmen's organizations and fisheries, promoting "catch and release" and the impacts excessive harvests can have on wildlife populations.

8.3.0.17 Develop an educational outreach program using a variety of media to ensure maximizing the distribution of information, in particular targeting sportsmen's organizations and fisheries, promoting "sustainable harvest" using scientific data, and garner support from constituents through this outreach.

8.3.0.24 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

8.3.0.25 Develop educational outreach programs for landowners, nurseries and the general public regarding the negative impacts of invasive and non-native plants on our natural communities.

8.3.0.26 Develop educational outreach programs for private and public landowners and land managers regarding the importance of and how to manage core forests and forested corridors in a way that will be beneficial for SGCN, particularly endangered, threatened and special concern species.

8.3.0.27 Develop educational outreach programs for public and private landowners and land managers regarding the importance of structural habitat diversity, methods to increase diversity, and/or incentive programs available to increase habitat diversity.

8.3.0.28 Develop educational outreach programs for public and private landowners and land managers regarding the importance of managing grasslands for grassland-dependent species, methods of management, and/or incentive programs available.

8.3.0.29 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about the importance of maintaining a vegetative buffer along riparian and aquatic habitats to intercept storm water runoff and minimize soil erosion.

8.3.0.30 Develop educational outreach programs for private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.4 Develop a plan that directs the creation of new impoundments and/or the expansion of bogs for cranberry farming within or immediately adjacent to critical forested habitats in a manner that minimizes impacts on the natural hydrology of the watershed and subsequently, the natural wetlands in the area.

9.1.0.5 Develop a plan that directs the creation or expansion of energy or utility rights-of-way in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.6 Develop a plan that directs the creation or expansion of roads and railroads or the re-establishment of abandoned railroads within and adjacent to critical forested habitats in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.7 Develop a plan that directs the maintenance of or new channelization of forested streams and rivers in a manner that minimizes impacts of the aquatic ecological system and adjacent forest

9.1.0.8 Develop a plan that focuses on strategies for oil pipelines to avoid sensitive habitats that would be highly impacted by oil spills.

9.1.0.9 Develop a plan that focuses on strategies to minimize the creation of renewable energy farms (e.g., solar, wind) and related infrastructures within and their impacts on forested habitats and the wildlife community.

9.1.0.10 Develop a plan that focuses on strategies to minimize the impacts of mining on critical forested habitats.

9.1.0.11 Develop a plan that focuses on strategies to minimize the impacts of power plants on critical forested habitats and the wildlife community.

9.1.0.13 Develop a plan to minimize agriculture that would result in groundwater withdrawal in critical forested areas.

9.1.0.14 Develop a plan to minimize development that would result in groundwater withdrawal in critical forested areas.

9.1.0.15 Develop a plan to minimize fragmentation of terrestrial and aquatic habitats by roads.

9.1.0.16 Develop a plan to minimize new lawnscapes and preserve natural vegetation within and adjacent to critical forest areas.

9.1.0.17 Develop a plan to minimize nutrient and effluent loads from aquaculture practices.

9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

9.1.0.20 Develop a plan to minimize the impacts of existing agricultural properties adjacent to and the conversion of forest habitats (terrestrial and aquatic, within or adjacent to critical forests) to agriculture, grazing areas/livestock farms, and plantations.

9.1.0.21 Develop a plan to minimize the use of any-sized dam in critical forested areas.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.23 Develop a plan to mitigate the effects of transportation barriers by using CHANJ products.

9.1.0.24 Develop a plan to prevent livestock from entering water bodies in critical forested habitats.

9.1.0.25 Develop a plan to prevent the conversion of forested stream buffers to pastures in critical forested habitats.

9.1.0.26 Develop a plan to minimize any adverse impacts of aquaculture farming techniques and structures on freshwater and intertidal habitats.

9.1.0.27 Develop a plan to use wildlife-appropriate culverts in critical forested areas.

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.31 Develop wetland restoration plans that consider the life history and needs of wildlife occupying targeted habitats.

9.1.0.32 Incorporate aquatic habitat connectivity and water quality/effluent standards into local and state aquaculture plans and BMPs.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.5 Develop response plans to address disease outbreaks within wildlife populations, in particular SGCN.

9.3.1.6 Amend NJ's current oil spill response plan to 1) expand the geographic area addressed, 2) expand the targeted species impacted and in need of recovery, and 3) revise current and integrate new actions into the plan as needed.

9.3.1.7 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.10 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.1.12 Develop a management plan to benefit urban-associated SGCN based on research.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.14 Create species management plans that will promote the protection and where appropriate, the development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

9.3.1.15 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.1.16 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.1.19 Develop management strategies for freshwater SGCN fish and incorporate them into existing Freshwater Fisheries Management Plans.

9.3.1.20 Use compiled life history information on urban-associated SGCN regarding threats, breeding, fecundity, survival, habitat needs, wintering sites/roosts, migration routes and destinations, etc. to develop wildlife management strategies to benefit such species.

9.3.2 Listed species recovery planning

9.3.2.1 Develop proactive species recovery plans for all endangered and threatened species including guidance and objectives pertaining to critical and supporting habitat to meet and maintain recovery goals.

9.3.3 Habitat management planning

9.3.3.5 Develop a management plan using forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

9.3.3.6 Develop a management plan for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

9.3.3.7 Develop a management plan to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

9.3.3.8 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.3.9 Develop a response plan to outbreaks using BMPs to control infestations and limit their spread in a way that avoids excessive harm to non-target species.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.3.13 Develop a management plan that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas and prevents or ameliorates near-term impacts of climate change throughout the State, but in particular within the coastal and Delaware Bay areas.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.21 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.3.22 Create management plans to minimize and/or prevent wildlife road mortality that will incorporate wildlife passages in conjunction with barrier fencing and, where possible, seasonal closures. Aquatic-associated passages must avoid disturbance to the natural streambeds and riparian habitat, permit high volumes of water to flow freely, and provide adequate travel corridors for terrestrial wildlife, while maintaining stream flow for fish passage. Bridges that span rivers and streambeds and include floodplain habitat on either side of the span to provide travel corridors for terrestrial wildlife are preferred over culverts.

9.3.3.23 Create forest management plans that will promote the protection and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

9.3.3.24 Develop a plan to improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

9.3.3.28 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.3.29 Develop habitat management plans aimed at reducing or eliminating negative impacts of ORVs.

9.3.3.32 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3.34 Include controlled burn prescriptions in forest and stewardship plans to improve wildlife habitat.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

9.3.3.37 Develop management strategies for freshwater SGCN fish and incorporate them into existing Freshwater Fisheries Management Plans.

9.3.3.38 Use compiled life history information on urban-associated SGCN regarding threats, breeding, fecundity, survival, habitat needs, wintering sites/roosts, migration routes and destinations, etc. to develop habitat management strategies to benefit such species.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.3 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.9 Review strategies for creating or enhancing connectivity (e.g., installing appropriately-sized wildlife passages) between wetlands to allow wildlife to disperse naturally and safely.

11.1.1.10 Use CHANJ mapping in reviews of proposed energy, mining, transportation and utility service companies/agencies' projects to attempt to maintain habitat connectivity and reduce fragmentation, and identify potential impacts of the projects.

11.1.1.11 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed offshore energy projects relating to drilling, extraction and distribution of petroleum and gas products to reduce habitat destruction and minimize impacts on wildlife.

11.1.1.12 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed solar farm projects to reduce habitat fragmentation and minimize impacts on wildlife.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.2.2 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.2.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into the environmental review process to help establish policies and plans that minimize the impact of aquaculture on fish and wildlife.

11.1.2.4 Review strategies for creating or enhancing connectivity (e.g., installing appropriately-sized wildlife passages) between wetlands to allow wildlife to disperse naturally and safely.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.2 Provide technical support to public and private landowners and land managers for controlling invasive, native and non-native plant species in order to increase structural habitat diversity.

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.7 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on the importance of maintaining habitat connectivity, minimizing fragmentation, and the use of CHANJ products to help them target areas for such planning.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.11 Provide educational resources, training programs, and on-the-ground guidance to private and public landowners and land managers on the benefits of and for creating young forest and early succession habitat for SGCN.

11.2.0.12 Provide educational resources and technical support to public landowners and land managers for managing grasslands for grassland-dependent species.

11.2.0.13 Provide educational resources and technical support to public landowners, private landowners with sufficient acreage, and land managers to promote the protection and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

11.2.0.14 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters), and to enhance or restore biologically appropriate buffers.

11.2.0.15 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and landowners about the importance of retaining and in an effort to protect, create, enhance and/or restore vegetation along aquatic habitats.

11.2.0.16 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

11.2.0.18 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats.

11.2.0.19 Provide educational resources and technical support to public and private landowners and land managers to promote the protection and/or enhancement of scrub-shrub habitats for SGCN.

11.2.0.22 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

11.2.0.23 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to SGCN habitats to promote the protection and/or enhancement of those adjacent habitats to increase the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and that connect conserved SGCN habitats.

11.2.0.24 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers on how to manage vegetated roadside areas (e.g., mowing, brush-hogging, etc.) on a schedule that avoids peak activity periods for wildlife and therefore, minimizes harm.

11.2.0.25 Provide educational resources, training programs, and on-the-ground guidance to resource managers regarding the assessment of and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) related to residential and commercial development.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.1 Engage partners and stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.3 Provide educational resources, training programs, and on-the-ground guidance to DOD to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop and implement forest management and other practices that minimize disturbances to SGCN (i.e., beyond their federal requirements).

11.2.1.4 Provide educational resources, training programs, and on-the-ground guidance to dredging companies and resource managers on habitat creation and enhancement away from and outside of shipping lanes, and to identify seasonal timing of activities that would minimize impacts to wildlife and their habitats.

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

100 Law and Policy

100. Legislation

100.1.3 Sub-national Level

100.1.3.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.3.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.4 County and Local

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.3 Expand the acreages and enhance the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN through local ordinances.

100.1.4.4 Secure wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and biologically appropriate buffers through local ordinances.

100.1.4.5 Secure SGCN-inhabited/used freshwater wetlands and biologically appropriate buffers through local ordinances.

100.1.4.6 Secure fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through local ordinances.

100.1.4.9 Secure existing and developing old-growth forest stands with large trees, in particular those within large, contiguous forest tracts, through local ordinances.

100.1.4.10 Secure critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through local ordinances.

100.1.4.11 Secure riparian areas through local ordinances.

100.1.4.12 Secure scrub-shrub habitats for SGCN through local ordinances.

100.1.4.14 Adopt/pass local ordinances which require assessing and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.5.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.5.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into state/local policy to minimize the impact of aquaculture on fish and wildlife.

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100.1.5.5 Develop legislation to provide financial support for the New Jersey Invasive Species Strike Team.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.1 Develop (and/or improve) policies and/or regulations that will promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

100.3.0.5 Develop policies that will promote improved and secure habitat connections between conserved SGCN habitats.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.11 Develop policies that will ensure the protection and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

100.3.0.12 Develop policies that promote the preservation and protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.13 Develop policies that will promote protecting and restoring riparian areas.

100.3.0.14 Develop policies and/or regulations that increase the protective buffers of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) to biologically appropriate distances to benefit SGCN that rely upon these habitats and improve the function of the [associated] aquatic systems.

100.3.0.15 Develop policies that promote protecting and restoring scrub-shrub habitats to benefit shrub-dependent SGCN.

100.3.0.17 Develop and implement policies and/or regulations with the objective of reducing "by-catch" of SGCN and other non-target species.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.21 Develop policies that minimize wildlife road mortality through: 1) Requiring the integration of wildlife passages into all new and repaired roads, in particular those areas that will connect SGCN habitats, 2) Requiring current fish/wildlife passages be improved and maintained in perpetuity, 3) Supporting seasonal road closures, in particular for unimproved roads, 4) Supporting projects that work to improve connectivity of SGCN habitats such as land conservation through acquisition or other means.

100.3.0.22 Develop regulations that will protect urban-associated SGCN (restricting human access, buffering sensitive areas with postings, noise and/or light restrictions) in sensitive areas and/or during sensitive periods such as breeding, etc.

100.3.0.25 Amend the harvest quota or "bag limits" within the freshwater fish code relative to SGCN or sensitive game species' as needed.

100.3.0.26 Adopt regulations requiring the combined sewer overflow alternative analyses required by regulation address potential impacts to wildlife in watercourses or receiving water bodies.

100.3.0.31 Create or expand tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMPs.

100.3.0.32 Coordinate regulations across agencies to maximize availability of and enrollment in existing Forestry Stewardship Programs (e.g., "Woodland Stewards", Farm Bill, partners, etc.) to maintain and/or improve forest habitat.

100.3.0.33 Adopt additional timing restrictions, and any necessary permit conditions, into the Administrative Code for NJ DEP-permitted projects to minimize impacts on freshwater SGCN fish, in particular, within habitats during their vulnerable periods as identified through a thorough review of available information.

100.3.0.35 Incorporate Freshwater Fish Status Assessment (Delphi Technique) results pertaining to endangered and threatened species into regulations.

100.3.0.37 Develop a law and/or policy that requires NJ DEP to continue to address and correct the allowable combined sewer overflow inputs of solid waste into the marine environment to minimize harm to wildlife and their habitats.

100.3.0.38 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.3.0.39 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.3.0.40 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.

100.3.0.42 Fully adopt the former Storm water Management Rules' 300ft buffer requirements into the Flood Hazard Area Control Act Rules.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.48 Propose new State law or regulation mandating that a State-level "development impact fee" be assessed on all new development approved by municipalities (via the Municipal Land Use Law processes), and dedicate such monies to the development and implementation of regional Habitat Conservation Plans (or existing plans/programs serving the same regional function).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.53 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded rights-of-way corridors associated with energy transport/transmission.

100.3.0.54 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded surface mining areas.

100.3.0.55 Develop regulations to address potentially adverse effects of aquaculture on SGCN species and their habitats.

100.3.0.57 Develop regulations that when implemented will improve and secure habitat connections between conserved SGCN habitats.

100.3.0.58 Develop regulations that when implemented will promote the expansion of acreages and enhancement of the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.62 Develop regulations that when implemented will protect existing old-growth forest stands with large trees and/or stands that are being actively managed for old growth forests, in particular those within large, contiguous forest tracts.

100.3.0.63 Develop regulations that when implemented will preserve and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.64 Develop regulations that when implemented will protect and restore riparian areas.

100.3.0.65 Develop regulations that when implemented will protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

100.3.0.66 Develop regulations with the objective of reducing "by-catch" of SGCN and other non-target species.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.2 Create a policy that requires the NJ DEP to incorporate scientific information regarding climate change and sea level rise (e.g., predictions, habitat management/acquisition efforts to enhance resilience to inundation) on their websites and to work with other government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

100.4.0.3 Develop policies for mandatory buffer strips on preserved farmlands and state-owned agricultural lands.

100.4.0.4 Create a policy that requires the use of wildlife habitat and corridor mapping products for both regulatory use when conducting project reviews and planning/siting new or expanded rights-of-way projects.

100.4.0.8 Develop a white paper addressing the impacts that existing, new or expanded rights-of-way have upon wildlife, wildlife habitats and habitat connectivity.

100.4.0.9 Develop and implement policies to minimize the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats in order to benefit wildlife.

100.4.0.12 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.4.0.13 Develop policies for different circumstances (e.g., roadsides and medians, riparian, aquatic and terrestrial habitats) that outline appropriate habitat/vegetation management strategies and schedules to minimize risks to and benefit wildlife.

100.4.0.16 Develop policies to implement habitat management strategies that will increase the structural diversity surrounding areas used for energy, mining, and transportation and service corridors which include but are not limited to the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-

100.4.0.17 Develop policies to implement habitat management strategies, including prescribed burns, that will increase the structural diversity on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies to control and reduce the impacts of invasive, non-native species in order to increase structural habitat diversity.

100.4.0.18 Develop policies to minimize the extent of infrastructure associated with energy and service corridors or areas (e.g., wind and solar farms, pipelines, utility lines) and that require the implementation of habitat management strategies that will increase the structural diversity in the area including (e.g., the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides).

100.4.0.19 Develop regulations that will minimize the creation of new barriers, remove or replace current barriers with appropriately-sized systems to accommodate wildlife dispersal, and to minimize road widening and traffic volume increases within critical wildlife habitat areas.

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.21 Ensure that Section 303(d) of the Clean Water Act and applicable State statutory/regulatory requirements for surface water pollutant budgets are being met by monitoring and enforcing regulatory Total Maximum Daily Load (TMDL) targets established within regional Water Quality Management Plans.

100.4.0.22 Work with NJ DEP's Division of Land Use Regulation to ensure protection of listed species and their habitats during stream cleaning events.

100.4.0.23 Adopt additional timing restrictions, and any necessary permit conditions, into the Administrative Code for NJ DEP-permitted projects to minimize impacts on freshwater SGCN fish, in particular, within habitats during their vulnerable periods as identified through a thorough review of available information.

100.4.0.24 Develop policies to provide financial support for the New Jersey Invasive Species Strike Team.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Pinelands Freshwater Fish

Focal species that comprise this Conservation Target:

Banded Sunfish | Blackbanded Sunfish | Mud Sunfish | Swamp Darter

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats:

1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.1.1.2 Loss, alteration and/or degradation of habitat.

1.1.1.5 Impervious surfaces can lead to a decrease in water recharge.

1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.1.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats:

1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.2.1.2 Loss, alteration and/or degradation of habitat.

1.2.1.5 Impervious surfaces can lead to a decrease in water recharge.

1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.2.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats:

1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.3.1.2 Loss, alteration and/or degradation of habitat.

1.3.1.4 Impervious surfaces can lead to a decrease in water recharge.

1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.3.1.6 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture (Avg. Score: 1.00)

NJ Specific Threats: 2.1.1.3 Conversion of agricultural landscape that results in increased erosion, runoff, and chemical and thermal pollution decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.1.2 Small-holder Farming (Avg. Score: 1.00)

NJ Specific Threats: 2.1.2.2 Fragments terrestrial and aquatic habitats.

2.1.3 Agro-industry (Avg. Score: 1.00)

NJ Specific Threats: 2.1.3.2 Fragments terrestrial and aquatic habitats.

2.3 Livestock Farming and Ranching

2.3.2 Small-holder Grazing (Avg. Score: 2.00)

NJ Specific Threats: 2.3.2.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.2.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

2.3.3 Agro-industry Grazing (Avg. Score: 2.00)

NJ Specific Threats: 2.3.3.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.3.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

2.4 Marine and Freshwater Aquaculture

2.4.1 Subsistence/Artisinal Aquaculture (Avg. Score: 1.00)

NJ Specific Threats: 2.4.1.3 Potential for increased nutrient and effluent loads.

2.4.1.7 Potential for fish to escape and compete with, predate upon, interbreed with, or spread disease to SGCN fish species.

2.4.2 Industrial Aquaculture (Avg. Score: 1.00)

NJ Specific Threats: 2.4.2.3 Potential for increased nutrient and effluent loads.

2.4.2.7 Potential for fish to escape and compete with, predate upon, interbreed with, or spread disease to SGCN fish species.

3 Energy Production and Mining

3.1 Oil and Gas Facilities and Pipelines

3.1.1 Distribution processes of petroleum and other liquid hydrocarbons (Avg. Score: 2.00)

NJ Specific Threats: 3.1.1.2 Loss, alteration and/or degradation of habitat.

3.1.1.3 Increased risk of oil spills.

3.1.2 Natural gas distribution processes (Avg. Score: 2.00)

NJ Specific Threats: 3.1.2.1 Fragments terrestrial and aquatic habitats.

3.1.2.2 Loss, alteration and/or degradation of habitat.

3.1.2.3 Increased risk of gas leaks and explosions.

3.2 Mining and Quarrying

3.2.2 Surface Mining - Rock Quarry (and sand quarries) (Avg. Score: 1.00)

NJ Specific Threats: 3.2.2.1 Fragments terrestrial and aquatic habitats.

3.2.2.2 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

3.4 Conventional Power Plants

3.4.0 Conventional Power Plants (Avg. Score: 2.00)

NJ Specific Threats: 3.4.0.2 Loss, alteration and/or degradation of habitat due to new or the expansion of current facilities.

3.4.0.3 Alteration of the temperature, pH and/or hydrology of aquatic ecosystems change plant communities and can harm wildlife and/or impact their behavior and survivorship.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats: 4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads (Avg. Score: 1.00)

NJ Specific Threats: 4.2.1.4 Lines that cross or run parallel to streams result in a loss or reduction of vegetated riparian buffers and streamside shading, affecting water quality and in-stream habitat for aquatic biota.

4.3 Shipping Lanes

4.3.2 Dredging impacts (Avg. Score: 1.00)

NJ Specific Threats: 4.3.2.1 Threatens wildlife by disrupting/removing stream bottom habitat.

5 Biological Resource Use

5.2 Gathering Terrestrial Plants

5.2.3 Control (Avg. Score: 1.00)

NJ Specific Threats: 5.2.3.3 Removal of riparian or near-stream vegetation alters water quality and in-stream habitat for aquatic organisms by reducing streamside shading, increasing bank erosion, and affecting the natural filtering ability of trees, shrubs, and grasses.

5.3 Logging and Wood Harvesting

5.3.1 Intentional Use (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.1.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.1.6 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices in Atlantic White Cedar stands may destroy a unique wildlife wetland habitat that is difficult, and takes time, to restore.

5.3.2 Intentional Use (large scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.2.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.2.6 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices in Atlantic White Cedar stands may destroy a unique wildlife wetland habitat that is difficult, and takes time, to restore.

5.3.3 Unintentional effects (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.3.2 Poorly planned/implemented tree harvesting adjacent to waterways and vernal pools can lead to increased water temperatures, soil erosion and sedimentation, and reduces the potential for woody debris within the aquatic system, leading to negative impacts on wildlife.

5.3.4 Unintentional effects (large scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.4.3 Poorly planned/implemented tree harvesting adjacent to waterways and vernal pools can lead to increased water temperatures, soil erosion and sedimentation, and reduces the potential for woody debris within the aquatic system, leading to negative impacts on wildlife.

5.3.4.4 Infrastructure and/or equipment use may result in subtle changes to drainage patterns, adversely affecting vernal pool and wetland hydrology.

5.4 Fishing and Harvesting of Aquatic Resources

5.4.1 Intentional Use (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.4.1.3 Collection of fish for food, bait, or aquarium trade can lead to population exploitation.

5.4.1.4 Illegal collection of aquatic and semi-aquatic wildlife can have detrimental impacts on populations.

5.4.2 Intentional Use (large scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.4.2.2 Collection of fish for food, bait, or aquarium trade can lead to population exploitation.

5.4.3 Unintentional effects (subsistence/small scale) (Avg. Score: 3.00)

NJ Specific Threats: 5.4.3.4 Fish introduced for sport fishing can negatively impact native species by competing for resources and/or altering the habitat (e.g., disrupting benthic communities and/or severely impacting aquatic vegetation).

5.4.3.7 Improperly sanitized equipment, relocation of fish, importation and release of non-native species, and the use of bait from a different location can spread invasive species and diseases from one waterbody to another.

5.4.4 Unintentional effects (large scale) (Avg. Score: 3.00)

NJ Specific Threats: 5.4.4.1 Fish introduced for sport fishing can negatively impact native species by competing for resources and/or altering the habitat (e.g., disrupting benthic communities and/or severely impacting aquatic vegetation).

5.4.4.7 Improperly sanitized equipment, relocation of fish, use of bait from a different location, can spread invasive species and diseases from one waterbody to another.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized) (Avg. Score: 1.00)

NJ Specific Threats: 6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.

6.1.2 Boating (Avg. Score: 1.00)

NJ Specific Threats: 6.1.2.5 Watercraft can be a mechanism of transference of wildlife diseases and invasive plant species if gear is not properly sanitized between sites.

6.3 Work and Other Activities

6.3.1 Unauthorized research projects at significant habitats (Avg. Score: 1.00)

NJ Specific Threats: 6.3.1.1 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.1.2 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.1.4 Illegal transfer of freshwater fish from one waterbody/watershed to another can result in the spread of non-native, invasive and/or undesirable fish or mussel species and/or diseases.

6.3.2 Authorized research projects at significant habitats (Avg. Score: 1.00)

NJ Specific Threats:

6.3.2.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.2.3 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.2.5 Authorized transfer of freshwater fish from one waterbody/watershed to another can result in the spread of non-native, invasive and/or undesirable fish or mussel species and/or diseases.

6.3.3 Other "work" unrelated to research (Avg. Score: 1.00)

NJ Specific Threats:

6.3.3.1 Construction projects may disrupt normal wildlife behavior which can result in reduced reproductive success or survival, abandonment of critical sites, etc. (e.g., bridge-nesting birds).

6.3.3.4 Workers may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.3.5 Unauthorized manipulation of water level (for dam repair, dredging, aquatic vegetation control, etc.) particularly during spawning season or during the summer when temperatures are high and dissolved oxygen is low can have negative impacts on fish and fish habitat.

7 Natural Systems Modifications

7.2 Dams and Water Management/Use

7.2.1 Abstraction of Surface Water (domestic use) (Avg. Score: 3.00)

NJ Specific Threats:

7.2.1.1 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.1.2 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.1.3 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, and eliminates shallow water habitats.

7.2.1.4 Water intake systems associated with municipal water supply threaten aquatic organisms due to injury or mortality from impingement and/or entrainment.

7.2.2 Abstraction of Surface Water (commercial use) (Avg. Score: 3.00)

NJ Specific Threats:

7.2.2.1 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, eliminates shallow water habitats, and disrupts/removes stream bottom habitat.

7.2.2.2 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.2.3 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.2.4 Water intake systems associated with industrial use and power plants threaten aquatic organisms due to injury or mortality from impingement and/or entrainment.

7.2.3 Abstraction of Surface Water (agricultural use) (Avg. Score: 3.00)

NJ Specific Threats:

7.2.3.1 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.3.2 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, and eliminates shallow water habitats.

7.2.3.3 Impounding water to create or expand bogs for cranberry farming leads to the loss of natural wetlands and the alteration of the natural hydrology in the area.

7.2.3.4 Water intake systems associated with agriculture threaten aquatic organisms due to injury or mortality from impingement and/or entrainment.

7.2.3.5 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.5 Abstraction of Ground Water (domestic use) (Avg. Score: 3.00)

NJ Specific Threats: 7.2.5.1 Heavy withdrawal of ground water for domestic use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.6 Abstraction of Ground Water (commercial use) (Avg. Score: 3.00)

NJ Specific Threats: 7.2.6.1 Heavy withdrawal of ground water for industrial and commercial use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.7 Abstraction of Ground Water (agricultural use) (Avg. Score: 3.00)

NJ Specific Threats: 7.2.7.1 Heavy withdrawal of ground water for agricultural use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.9 Small Dams (Avg. Score: 2.00)

NJ Specific Threats: 7.2.9.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.9.2 Dams act as a barrier to fish movement, limiting the distribution of anadromous fish and fish that act as hosts for mussels.

7.2.9.3 Dams act as a barrier to movement, limiting the ability of aquatic or semi-aquatic wildlife to move safely between habitats.

7.2.10 Large Dams (Avg. Score: 3.00)

NJ Specific Threats: 7.2.10.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.10.2 Dams act as a barrier to fish movement, limiting the distribution of anadromous fish and fish that act as hosts for mussels.

7.2.10.3 Dams act as a barrier to movement, limiting the ability of aquatic or semi-aquatic wildlife to move safely between habitats.

7.2.11 Dams (size unknown) (Avg. Score: 2.00)

NJ Specific Threats: 7.2.11.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.11.2 Dams act as a barrier to fish movement, limiting the distribution of anadromous fish and fish that act as hosts for mussels.

7.2.11.3 Dams act as a barrier to movement, limiting the ability of aquatic or semi-aquatic wildlife to move safely between habitats.

7.2.12 Culverts (Avg. Score: 2.00)

NJ Specific Threats: 7.2.12.1 Improper design, placement, installation and maintenance of culverts and other stream crossing structures can impede or prevent the movements of terrestrial organisms and can restrict or limit stream flow, impeding the movement of aquatic organisms along riparian corridors.

7.2.13 Stream Burial (Avg. Score: 1.00)

NJ Specific Threats: 7.2.13.1 Eliminates riparian habitats.

7.2.13.2 Eliminates in-stream habitat and water resources for wildlife.

7.2.13.3 Alters the hydrology and quality of downstream aquatic and riparian habitats.

7.2.14 Tidal Water Management (Avg. Score: 1.00)

NJ Specific Threats: 7.2.14.3 Open marsh water management (and other techniques) to control mosquito populations may alter existing hydrologic or vegetative conditions to the detriment of other species.

7.3 Other Ecosystem Modifications

7.3.1 Shoreline Stabilization (Avg. Score: 1.00)

NJ Specific Threats: 7.3.1.2 Efforts to stabilize stream corridors, particularly near roads and infrastructure, in which vegetated and dynamic shorelines are replaced with unvegetated and rigid structures such as rip-rap, gabion, concrete raceways and bulkheads interfere with fish spawning, nursery and foraging areas.

7.3.3 Removal of coarse woody debris (streams, forests, scrub-shrub habitats) (Avg. Score: 3.00)

NJ Specific Threats: 7.3.3.1 Decreases the available detritus that normally accumulates behind and within stream obstructions, minimizing or eliminating food sources and shelters for fishes, invertebrates and amphibians.

7.3.3.2 Decreases habitat and/or corridor suitability due to limited or absent shelter and foraging habitat.

7.3.3.4 Decreases available basking, shelter, and foraging habitats.

7.3.5 Poor habitat management (Avg. Score: 2.00)

NJ Specific Threats: 7.3.5.2 Shifting from natural vegetation to lawns can cause increased temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

7.3.5.4 Vegetation clearing or inappropriate alteration adjacent to aquatic habitats threatens aquatic species by degrading habitat and water quality (altering temperature and dissolved oxygen, increasing siltation and desiccation, etc.).

7.3.5.8 Storm water outfall pipes can create habitats in small streams that are conducive to non-native predatory fish which can negatively impact native fish species.

7.3.5.9 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, eliminates shallow water habitats, and disrupts/removes stream bottom habitat.

7.3.5.10 Ditching, draining and filling of marshes and wetlands eliminates habitat and degrades the remaining surrounding areas for wildlife.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species (Avg. Score: 3.00)

NJ Specific Threats: 8.1.1.1 Displace or outcompete native species for resources.

8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.

8.1.1.4 Invasive, non-native animals increase the risk of predation on native animals and/or herbivory on native vegetation.

8.1.2 Invasive non-native aquatic animals (Avg. Score: 3.00)

NJ Specific Threats: 8.1.2.2 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminishing habitat suitability and reducing ecological integrity of natural communities, and may introduce disease into a population.

8.1.3 Invasive non-native aquatic plants (Avg. Score: 3.00)

NJ Specific Threats: 8.1.3.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.6 Invasive non-native fungal/bacterial diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.1.6.1 The introduction of non-native fungal and bacterial diseases threatens native populations and ecosystems.

8.2 Problematic Native Species/Diseases

8.2.2 Named Species (Avg. Score: 1.00)

NJ Specific Threats: 8.2.2.2 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.3 Introduced Genetic Material

8.3.0 Introduced Genetic Material (Avg. Score: 1.00)

NJ Specific Threats: 8.3.0.1 Introduction of farm-reared species (e.g., bobwhite and brook trout) for hunting and fishing purposes introduces genetic material into the native population when species hybridize.

8.3.0.2 Species hybridizing as a result of the alteration of, and subsequent connectivity of, habitats that once separated species.

8.4 Problematic Species/Diseases of Unknown Origin

8.4.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.4.1.1 Non-native or poorly understood diseases and parasites could potentially impact native animals.

8.5 Viral/Prion-induced Diseases

8.5.2 Named Species (Disease) (Avg. Score: 3.00)

NJ Specific Threats: 8.5.2.2 Viral Hemorrhagic Septicemia (VHS) (recently introduced into the Great Lakes) has caused mortality in 30 common fish species across many families. Although many of the fish SGCN have not been tested, it is hypothesized that they may be vulnerable. If introduced into NJ, VHS is predicted to cause widespread fish kills.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.1 Domestic and Urban Waste Water

9.1.1 Sewage (Avg. Score: 2.00)

NJ Specific Threats: 9.1.1.1 Degradation of aquatic and marine water quality and habitats by changing turbidity, flow and water chemistry.

9.1.1.2 Leads to increased eutrophication and algae blooms that result in oxygen depletion.

9.1.1.3 Contaminants in sewage treatment effluents and Combined Sewer Overflows can cause developmental and behavioral abnormalities and reproductive failure in wildlife.

9.1.2 Run-off (Avg. Score: 3.00)

NJ Specific Threats: 9.1.2.1 Chemical fertilizers and nutrient run-off changes the pH in streams and ponds and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.1.2.2 Contaminants degrade aquatic and marine water quality and can bioaccumulate in benthic organisms, threatening wildlife by causing developmental and behavioral abnormalities and reproductive failure.

9.1.2.3 Contaminants from road runoff (oil, sediment, salt, etc.) impact native vegetation and the species that rely upon them, degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2 Industrial and Military Effluents

9.2.1 Oil Spills (Avg. Score: 3.00)

NJ Specific Threats: 9.2.1.1 Oil spills render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.1.2 Oil spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.1.3 Oil spills cause external oiling of wildlife and ingestion of oil, both of which can injure or kill wildlife.

9.2.2 Seepage from Mining (Avg. Score: 1.00)

NJ Specific Threats: 9.2.2.1 Contaminants from mining degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2.3 Other (Avg. Score: 2.00)

NJ Specific Threats: 9.2.3.1 Point and nonpoint source pollution such as polychlorinated biphenyls (PCBs), pesticides, heavy metals, and endocrine disrupting compounds (EDC's) into freshwater and marine systems pose threats to wildlife through direct contact and/or ingestion, and to aquatic species and their predators through bioaccumulation, impacting the reproductive success and neurological function of many avian and fish species.

9.2.3.2 Chemical spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.3.3 Chemical spills may render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.4 Other: Hydrofracturing (Avg. Score: 1.00)

NJ Specific Threats: 9.2.4.1 Contaminants from hydrofracturing degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2.4.2 Uncontrolled effluents escaping from hydrofracturing facilities can cause injury to wildlife and alter normal behaviors.

9.2.5 Other: Industrial toxic settling ponds (Avg. Score: 1.00)

NJ Specific Threats: 9.2.5.1 Surficial or open industrial effluent ponds can cause injury or death to wildlife that become exposed through ingestion or submersion.

9.3 Agricultural and Forestry Effluents

9.3.1 Nutrient Loads (Avg. Score: 3.00)

NJ Specific Threats: 9.3.1.1 Chemical fertilizers and nutrient run-off changes the pH in streams, ponds and wetlands and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.3.1.2 Animal waste degrades terrestrial and aquatic habitats, especially streams, ponds and wetlands, resulting in eutrophication, which disrupts oxygen and nutrient balances, and causes injury and mortality to aquatic organisms.

9.3.1.4 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades wetland and aquatic habitats with runoff, increasing sediment and nutrient loads and pH.

9.3.1.5 Conversion of native forests to plantations degrades wetland and aquatic habitats through increased runoff.

9.3.2 Soil Erosion and Sedimentation (Avg. Score: 3.00)

NJ Specific Threats: 9.3.2.1 Soil erosion, sedimentation and destruction of streambanks and riparian buffers degrade waters making them unsuitable for riparian-dependent wildlife.

9.3.2.3 Conversion of native forests to plantations degrades wetland and aquatic habitats through increased sedimentation.

9.3.3 Herbicides and Pesticides (Avg. Score: 3.00)

NJ Specific Threats: 9.3.3.1 Pesticides degrade terrestrial and aquatic habitats, especially streams, ponds and wetlands. Aquatic wildlife are particularly sensitive to these contaminants, which can cause developmental and behavioral abnormalities and reproductive failure. Some contaminants may bioaccumulate in predatory fish and birds and disrupt reproduction.

9.3.3.3 Use of pesticides can directly harm non-target species through direct contact and/or by reducing and/or contaminating their food supply.

9.3.4 Other (Avg. Score: 2.00)

NJ Specific Threats: 9.3.4.1 Spills, leaks or discharges of fuel, oil or other contaminant fluids from machinery or equipment used in the normal course of agricultural or forestry activities can degrade or destroy adjacent aquatic and terrestrial habitats and/or cause harm to non-target species (plants and animals).

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture (Avg. Score: 2.00)

NJ Specific Threats: 9.3.5.1 Use of pesticides, insecticides, and/or herbicides can directly harm non-target species, such as amphibians and beneficial invertebrates through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5.4 Improper use of current insecticides, such as those containing esfenvalerate, prallethrin, or piperonyl butoxide, or past use of pesticides containing chlordane still present in the soils, are toxic to various wildlife species, and can cause injury, mortality, or other effects that impair population viability.

9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.4 Garbage and Solid Waste

9.4.1 Direct hazards to wildlife (Avg. Score: 1.00)

NJ Specific Threats: 9.4.1.2 Garbage and solid waste destroys natural habitats and obstructs wildlife movements.

9.5 Air-Bourne Pollutants

9.5.4 Other (Avg. Score: 1.00)

NJ Specific Threats: 9.5.4.1 Dust and/or airborne sedimentation from construction sites, agricultural operations or related earth disturbances can introduce mineral or organic sediments into adjacent wildlife habitats, degrading their quality and suitability for wildlife short-term and/or long-term.

9.5.6 Herbicides and Pesticides (Avg. Score: 2.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

9.6 Excess Energy

9.6.2 Thermal Pollution (Avg. Score: 1.00)

NJ Specific Threats: 9.6.2.1 Water temperature changes due to industrial discharge of heated water may impact species composition in the receiving waterbody. Species such as sea turtles and migrating fish may be attracted to the thermal plume and become more vulnerable to mortality during emergency shutdowns during cooler months.

9.6.2.2 Water temperature changes to aquatic systems can deter or preclude use by SGCN (e.g., alter habitat suitability for wildlife species, reduce prey base) or present stressors that are harmful if not fatal to wildlife.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 3.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.2 Droughts

11.2.1 Droughts (Avg. Score: 2.00)

NJ Specific Threats: 11.2.1.1 Contribute to hardened soils, decreasing water recharge during rains and increasing the likelihood of flash floods during storms.

11.2.1.2 Lead to lower groundwater levels and therefore, less available water for people and habitats.

11.2.1.3 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

11.3 Temperature Extremes

11.3.1 Temperature extremes (Avg. Score: 2.00)

NJ Specific Threats: 11.3.1.1 Increasing temperatures may cause habitat loss and degradation by desiccating and/or raising the temperatures of small wetlands and streams leading to the loss of freshwater mussels and other aquatic species and species reliant upon these habitats.

11.3.1.2 Increased temperatures can negatively impact wetland, riverine, lacustrine and vernal pool-associated or -dependent wildlife by reducing flows, increasing water temperatures, lowering water levels and causing premature drying of vernal habitats.

11.4 Storms and Flooding

11.4.1 Storms and flooding (Avg. Score: 2.00)

NJ Specific Threats: 11.4.1.1 Extreme storms and flooding events threaten aquatic and marine wildlife through habitat degradation and alteration, including alterations to off-shore or back-bay benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic and marine wildlife.

11.4.1.3 Increase risk of saltwater intrusion to freshwater habitats altering the water chemistry and potentially altering aquatic wildlife community.

11.4.1.4 Flood events alter river or stream morphology, benthic conditions and habitat availability for wildlife, cause bank erosion, and deposit sediments in floodplain wetlands altering wildlife habitat.

11.4.2 Increased rainfall (Avg. Score: 2.00)

NJ Specific Threats: 11.4.2.1 Extreme rain events threaten aquatic wildlife through habitat degradation and alteration, including alterations to benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic wildlife.

11.6 Phenology Shifting or Alteration

11.6.2 Phenology shifts related to predator-prey ecology (Avg. Score: 1.00)

NJ Specific Threats: 11.6.2.1 Alters inter-specific relationships (e.g., competition, parasitism, predation) of wildlife, ultimately leads to detrimental impacts on the ecological system.

11.6.2.2 Shifts timing of species migration, breeding and hibernation, and available food resources, causes redistribution of species, or mortality for species that are unable to relocate due to their already isolated habitat or limited mobility.

11.6.3 Phenology shifts related to species redistribution (Avg. Score: 3.00)

NJ Specific Threats: 11.6.3.1 Shifts in timing of species migration, breeding and hibernation, and available food resources, as a result of wildlife range shifts driven by climate change.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 2.00)

NJ Specific Threats: 12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.2 Lack of up-to-date existing information (Avg. Score: 2.00)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.3 Need to answer research question (Avg. Score: 2.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.4 Need to develop new technique (Avg. Score: 1.00)

NJ Specific Threats: 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 1.00)

NJ Specific Threats: 12.3.0.2 Delays between State species status reviews and regulation amendments to incorporate the findings leads to extended periods when imperiled species do not receive the benefit of land use and other regulatory protections.

12.3.0.4 The NJ Administrative Code (N.J.A.C.) fails to protect native, freshwater fish species from collection and/or their use as bait.

12.3.0.5 NJDEP land use regulations provide no protection for spawning habitats of native, freshwater fish that are identified as candidates for State endangered, threatened, or special concern status.

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 1.00)

NJ Specific Threats: 12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 2.00)

NJ Specific Threats: 14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 2.00)

NJ Specific Threats: 14.2.1.2 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various aquatic and riparian management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 1.00)

NJ Specific Threats: 15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.4 Secure and promote the protection, restoration, and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts through incentive programs.

1.2.1.5 Secure and promote the protection/restoration of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through incentive programs.

1.2.1.6 Secure and promote the protection/restoration of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers through incentive programs.

1.2.1.7 Secure and promote the protection/restoration of fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.9 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing Forestry Stewardship Programs.

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.12 Create incentives (non-monetary and/or monetary) for land developers to redevelop abandoned areas (e.g., shopping centers, office complexes) to minimize the loss of natural habitats and reduce the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.14 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of herbicides and pesticides, and implementing more ecologically safe strategies when using such products.

1.2.1.16 Create incentives (non-monetary and/or monetary) within State regulations (mitigations requirements or credit, BMP satisfaction, etc.) to promote the use of retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.17 Develop a public-relations oriented certification program for private retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.18 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and land managers to control and reduce the impacts of invasive, native and non-native species in order to increase structural habitat diversity.

1.2.1.22 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to horse/livestock farm owners and managers to increase structural habitat diversity in and around the farms by managing vegetation for a variety of species, in particular, farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

1.2.1.23 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to provide cost shares and/or plan approvals for management based on management approaches and prescriptions.

1.2.1.25 Create incentives (non-monetary and/or monetary) within State regulations to assist and programs to deliver those incentives to aquaculture growers to relocate, for example, from intertidal to subtidal lease areas through buyouts of leases or microloans, and/or promoting on-lease conservation measures used by aquaculture growers (such as the implementation of conservation easements, use of living shorelines, incorporation of BMPs for habitat protection, etc.) for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

2 Direct Management of Natural Resources

2.2 Dam and barrier removal

2.2.1 Culvert work

2.2.1.1 Replace existing barriers to wildlife movement with and/or install appropriately-sized systems to accommodate wildlife dispersal.

2.2.5 Obstruction removal

2.2.5.1 Enhance fish SGCN habitats by removing obstructions to fish passage to benefit those species.

2.6 Hazard or infrastructure removal

2.6.6 Shoreline armoring removal

2.6.6.1 Remove shoreline armoring to reduce its impacts on aquatic habitats.

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.1 Control invasive insect infestations by implementing BMP strategies through biological, chemical and/or mechanical means that will depress, or when appropriate, eradicate populations in a manner that avoids excessive harm to non-target species using BMPs to control infestations and limit their spread based on an inventory of invasive insect distribution and response to outbreaks.

2.8.0.2 Develop, implement, monitor and evaluate pest control/management strategies to reduce the impacts of over-abundant wildlife species (native and/or native, invasive species) on native vegetation and the degradation of habitats supporting SGCN. Over-abundant wildlife species include but are not limited to mute swans, Canada geese, beaver and white-tailed deer.

2.8.0.3 Work with NJ Invasive Species Strike Team to identify areas with and eradicate aquatic invasive species such as the Asian Swamp Eel, Northern Snakehead, and the Chinese pond mussel. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.5 Implement biologically safe and appropriate control/management strategies, and where appropriate, eradication strategies to reduce the impacts and/or limit the distribution of invasive and/or non-native plant species within or near aquatic systems using methods that will provide the most protection to the aquatic and riparian ecological system, and minimize disturbance to the soil and wildlife. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.8.0.6 Implement long-term management of invasive and/or non-native plants to help maintain functioning ecological systems and biological diversity, and to enhance travel corridors. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.9 Living shorelines

2.9.2 Erosion control structures

2.9.2.1 Install breakwaters in the form of living shorelines to reduce the impact of wave erosion while preserving the natural character of the site.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.3 Restore and/or enhance habitats to benefit urban-associated SGCN.

2.10.0.4 Restore and/or enhance suitable travel corridors connecting conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.8 Protect significant natural and/or unique communities by implementing best management practices when conducting habitat restoration strategies.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.12 Create and/or maintain scrub-shrub habitats through revegetation efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.10.0.13 Restore and/or enhance impoundments to provide suitable foraging and nesting habitat for SGCN species inhabiting them (e.g., bitterns, rails, ducks, turtles and some invertebrates).

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.17 Maintain, enhance and/or restore SGCN-inhabited/used freshwater wetlands through restoring submerged aquatic vegetation.

2.10.0.21 Restore and/or enhance understory habitats that suppress invasive species and provide critical resources and enhance sheltering, foraging, and nesting cover for wildlife.

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.10.0.24 Use NJ's CHANJ mapping and guidance to establish vegetation and enhance or create corridors between fragmented habitats with similar vegetation, slope, soils, structure, etc. to ensure vegetative integrity is maintained to allow wildlife to safely disperse, and corridors are buffered with natural habitats to minimize disturbance to wildlife within the corridors.

2.10.0.25 Enhance SGCN fish habitats through aquatic and riparian vegetation restoration.

2.10.0.26 Reestablish/restore historically important submerged aquatic vegetation beds in Delaware Bay tributaries to benefit SGCN waterfowl, waterbirds, terrapins, sea turtles and finfish.

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through vegetation management.

2.11.0.6 Reclaim degraded rare species habitats by conducting vegetation management needed to restore habitat value for the documented/target SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.8 Maintain, enhance and/or restore biologically appropriate buffers for SGCN-inhabited/used freshwater wetlands through vegetation management.

2.11.0.13 Implement best management practices (BMPs), protective strategies, and guidelines for vegetation management to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.11.0.15 Implement vegetation management to benefit urban-associated SGCN.

2.11.0.16 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.11.0.18 Implement forest management/silvicultural strategies that promote the development of new old-growth forests and/or minimize the loss of old-growth forest stands with large trees and within large, contiguous tracts.

2.11.0.19 Implement forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN.

2.11.0.21 Minimize the degradation, alteration and/or changes in hydrology of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and subsequent disturbances to and behavioral changes of wildlife by maintaining or enhancing these areas and biologically appropriate buffers through habitat management and/or revegetation or restoration efforts.

2.11.0.22 Minimize habitat loss of high and low marsh habitats that provide nesting, migrating and wintering areas for SGCN birds and other marsh-dependent SGCN by maintaining or enhancing these areas through habitat management and/or revegetation or restoration efforts.

2.11.0.24 Conduct vegetation management adjacent to aquatic habitats following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.25 Conduct vegetation management along access roads following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.27 Conduct vegetation management for target shrub- or young forest-dependent SGCN following BMPs to minimize the risk of the establishment of invasive and non-native plants.

2.11.0.28 Conduct vegetation management in agricultural areas following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.29 Conduct vegetation management on transportation and service corridors (i.e., rights-of-way) following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.33 Increase structural habitat diversity by implementing long-term vegetation management to minimize the potential for the establishment of invasive and/or non-native plants that may outcompete native vegetation.

2.11.0.34 Increase structural habitat diversity by managing residential, commercial and recreational areas' landscapes for a variety of species. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.35 Increase structural habitat diversity by managing vegetation adjacent to aquatic habitats in a manner that provides a buffer from runoff and erosion and a microclimate to stabilize seasonal temperatures to benefit a variety of aquatic and semi-aquatic species.

2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.

2.11.0.37 Increase structural habitat diversity by minimizing the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats which benefits wildlife.

2.11.0.38 Increase structural habitat diversity in and around horse/livestock farms by managing vegetation for a variety of species, in particular, in and around farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

2.11.0.43 Manage forests to increase variation in age structure and composition using BMPs that promote and maintain functioning ecological forest-based systems and biological diversity.

2.11.0.44 Manage phragmites adjacent to coastal marshes of interest, in particular those that are within underdeveloped areas and are unprotected, through herbicide application and water management to improve resiliency of the marshes to sea level rise.

2.12 Water management

2.12.1 Ditch plugs

2.12.1.1 Implement best management practices (BMPs), protective strategies, and guidelines for ditch plugging to maintain and enhance healthy, resident and migratory SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.12.2 Diversion/headgate

2.12.2.1 Prevent or ameliorate near-term impacts of climate change throughout the State but in particular within the coastal and Delaware Bay areas by implementing habitat management strategies that will establish/improve habitat resilience, such as using diversions, that benefits wildlife inhabiting these areas.

2.12.3 Drainage

2.12.3.1 Remove drainage ditches to benefit urban-associated SGCN.

2.12.3.2 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) such as removing drainage ditches to restore natural stream flows and wetlands, that benefit wildlife inhabiting these areas.

2.12.3.3 Remove tile drains and drainage ditches to improve wetland hydrology and restore natural stream flows during appropriate times to avoid sensitive periods (e.g., nesting, denning, roosting) and minimizes harm to wildlife, particularly SGCN.

2.12.3.4 Expand the acreages and enhance the effective size of SGCN habitats by reclaiming/restoring adjacent, degraded habitats by removing tile drains and drainage ditches.

2.12.3.6 Protect significant natural and/or unique communities by and when removing tile drains and drainage ditches.

2.12.3.11 Implement best management practices (BMPs), protective strategies, and guidelines when removing tile drains and drainage ditches to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.12.5 Spring development

2.12.5.1 Implement a habitat improvement and restoration program to restore cold-water fish habitat, ecosystems and populations.

2.12.7 Waterfowl impoundment maintenance

2.12.7.1 Manage impoundments to benefit SGCN species inhabiting them (e.g., bitterns, rails, ducks, turtles and some invertebrates).

2.12.7.3 Implement best management practices (BMPs), protective strategies, and guidelines for impoundment management to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.12.7.4 Implement impoundment management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimizes harm to wildlife, particularly SGCN.

2.12.7.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through impoundment management.

2.12.7.6 Reclaim degraded rare species habitats through impoundment management needed to restore habitat value for the documented/target SGCN.

2.12.7.7 Protect significant natural and/or unique communities by implementing best management practices for impoundment management.

2.12.7.8 Repair impoundments damaged by salt hay farm/dike abandonment and conduct restoration of degraded sites for targeted SGCN species and their habitats.

2.12.7.14 Prevent or ameliorate near-term impacts of climate change throughout the State but in particular within the coastal and Delaware Bay areas by implementing habitat management strategies that will establish/improve habitat resilience, such as impoundment management, that benefits wildlife inhabiting these areas.

2.13 Wildlife damage management

2.13.0 Nuisance fish and wildlife damage

2.13.0.1 Investigate the impacts of mosquito control methods on predator SGCN (bats, insectivorous birds). Develop, implement and evaluate the effectiveness of mosquito control-BMPs designed to avoid depletion or contamination of SGCN's insect prey base and drinking sources with pyrethroids, organophosphates, or other chemicals.

2.13.0.4 Investigate the effects of mosquito control methods on freshwater aquatic and semi-aquatic SGCN including but not limited to, amphibian, fish, dragonfly, and damselfly populations.

2.13.0.5 Investigate the impacts of human-subsidized and/or naturally occurring predator species on SGCN to assess the need for integrated wildlife damage management techniques (e.g., predator exclosures, fish blockages, electric fence, culls) and/or policy changes on state land management that minimize the impacts of human-subsidized predators.

2.13.0.8 Implement and assess management strategies to control and reduce the impacts of detrimental species and diseases that pose threats to native wildlife or communities.

2.14 Wildlife disease management

2.14.0 Wildlife disease strategy development and investigation

2.14.0.1 Investigate diseases/pathogens impacting SGCN and/or their habitats.

2.14.0.2 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

2.14.0.3 Protect SGCN from exotic pathogen introduction or incident through implementation of a "rapid response plan"; DFW to give priority attention to these species in planning and/or implementing a response.

2.14.0.4 Conduct long-term monitoring of diseases in vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts.

2.14.0.5 Assess the impacts of diseases on the life cycles of wildlife.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.6 Conduct long-term studies on resident and migratory SGCN to determine if there are changes to the populations' demography (productivity, survival, dispersal) and/or to their critical and/or supporting habitats (i.e., diminishing in value, acreage or connectivity, etc.), in particular changes that would not maintain SGCN at viable levels for species populations. Update data and GIS maps; provide updated information to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.11 Develop, implement and evaluate the effectiveness of town plans that avoid impacts to SGCN species and their habitats.

3.0.0.12 Compile available life history information on urban-associated SGCN (e.g., predators, levels of nest/young depredation, breeding longevity and reproductive effort over time, preferred nesting/reproductive requirements, fidelity to breeding and wintering sites, comprehensive assessment of migration routes and destinations) for future development of management strategies to benefit such species.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.14 Identify areas with invasive, aquatic plants and animals and collect a detailed baseline assessment of the species' status and distribution. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort. Researchers and contractors performing Forest Stewardship Inventories and/or Plans on state lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.0.0.15 Conduct long-term monitoring of areas identified as having invasive, aquatic plants and animals to track the species' status/progress over time with or without the implementation of management strategies. Areas without management strategies should be assessed and prioritized for management/control. Areas where management strategies are being implemented should include an assessment of the management effort and identify/recommend and implement necessary changes to improve its success. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort.

3.0.0.19 Identify the presence and status (e.g., functioning, structure, slated for removal, etc.) of existing dams and culverts within and/or that may impact SGCN and their habitats, and create a database that includes a GIS component identifying the locations of such structures and their status. Share this information with appropriate organizations and/or agencies evaluating the benefits and risks of such structures on SGCN and their habitats.

3.0.0.20 Once baseline data identifying and describing the status of existing dams and culverts have been gathered, conduct evaluations at a variety of sites to determine whether the benefits of culvert and dam creation or removal outweigh the risks to SGCN species and their habitats, and if other variables/conditions specific to individual sites/locations result in a different outcome. Identify and target appropriate dams and culverts for removal and/or reconstruction to minimize harm to SGCN species and their habitats.

3.0.0.23 Identify (through wildlife and aquatic system surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and research water quality parameters for all [types of] aquatic systems for various SGCN populations.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.2 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.0.3 Survey for and monitor populations of freshwater aquatic focal SGCN to assess the populations' demography, trends, condition, distribution, etc.

3.2.0.4 Conduct long-term monitoring of the impacts of contaminants to vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.2.0.5 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

3.2.0.7 Track (via a database that includes a GIS component) and research problematic species and diseases to determine their distribution, impacts on SGCN wildlife/wildlife communities, and develop potential control measures.

3.2.0.8 Implement and conduct long-term monitoring of control measures aimed at minimizing the impacts of problematic species and/or diseases to evaluate the effectiveness of such efforts and to identify and incorporate additional strategies as appropriate.

3.2.0.10 Evaluate the effectiveness of sanitation/decontamination protocols in minimizing the transference of wildlife diseases and invasive plant species.

3.2.0.15 Identify and compile information regarding critical time periods in which freshwater SGCN fish are vulnerable (e.g., spawning periods) using literature searches, review of available data, enlistment of species experts, etc.).

3.2.0.18 Conduct baseline surveys/inventories to better understand the distribution of fish and invertebrate (including freshwater mussels) populations.

3.2.0.21 Investigate the effects of mosquito control methods on freshwater aquatic and semi-aquatic SGCN including but not limited to, amphibian, fish, dragonfly, and damselfly populations.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.2 Age, size and sex structure

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.3 Baseline inventory

3.2.3.4 Establish population estimates and trends for all managed fish species.

3.2.3.6 Investigate the feasibility and potential for success of conducting genetic rescue through translocation and/or reintroduction of animals into suitable habitat that was historically occupied to increase genetic diversity and reconnect isolated populations. Methods of investigation should include, but are not limited to, thorough literature reviews, expert opinions, identifying potential pitfalls (e.g., species' fidelity to their range or critical areas), and an examination of historic and current SGCN population distribution and suitable habitat availability.

3.2.5 Genetics

3.2.5.1 Investigate the feasibility and potential for success of conducting genetic rescue through translocation and/or reintroduction of animals into suitable habitat that was historically occupied to increase genetic diversity and reconnect isolated populations. Methods of investigation should include, but are not limited to, thorough literature reviews, expert opinions, identifying potential pitfalls (e.g., species' fidelity to their range or critical areas), and an examination of historic and current SGCN population distribution and suitable habitat availability.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.6 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) that could, through revegetation and/or enhancement efforts, become suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN.

3.3.1.7 Map and prioritize existing and potential areas for early succession forest management. Share the results with state, county and municipal planners.

3.3.1.8 Assess the availability and suitability of forest habitats for SGCN species (particularly reptiles and amphibians, birds, pollinators, and tiger beetles) in southern forests since Superstorm Sandy.

3.3.1.10 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and document fish SGCN habitats by plotting their distributions in GIS and submitting the data to the State for integration into the DEP's Biotics database.

3.3.1.11 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the quality and importance of areas with submerged aquatic vegetation to benefit waterfowl, finfish, and shellfish species.

3.3.1.16 Gather "best information" for spatial modeling and update/create a current model/depiction of anticipated habitat shifts from sea-level rise, flooding, etc.

3.3.1.18 Conduct an assessment using available data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels.

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.1.23 Identify areas (through surveys/studies, predictive modeling, review of available data, enlistment of habitat management and/or species experts, etc.) where the State can allow coastal marsh migration due to sea level rise, and target these areas for land acquisition and/or land management to accommodate this transition. Targeted areas should include underdeveloped areas adjacent to unprotected coastal marshes.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.1.26 Survey all historic locations and unsurveyed suitable habitats to identify populations of freshwater aquatic focal species.

3.3.1.27 Develop a matrix that lists every commercial and recreational fishery and aquaculture facility that operates in state waters and for each fishery listed, provide details regarding their fishing seasons, gear descriptions, locations and number of fishers. Add a GIS component to overlay species of concern and sensitive areas.

3.3.2 Monitoring

3.3.2.1 Evaluate the effectiveness of forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.4 Protect water quality and aquatic-dependent species by appropriately designating Category 1 waters and enforcing protective regulations. Seek appropriate classifications for stream segments based on Endangered and Threatened Status and/or the Index of Biotic Integrity (IBI) results that do not fulfill Category One requirements.

3.3.2.5 Conduct long-term monitoring of water quality of SGCN aquatic habitats (and aquatic systems feeding into those habitats) to evaluate protection and management efforts to reduce, if not eliminate, chemical contamination, siltation, eutrophication, and other forms of pollution/contamination of aquatic systems.

3.3.2.7 Conduct studies on land use practices such as ditching, impounding, dredging, open marsh water management, burning, and marsh restoration to evaluate the effectiveness and potential impacts on marsh-dependent SGCN.

3.3.2.8 Evaluate the effectiveness of current prescribed burning practices on Pinelands dependent species.

3.3.2.14 Research and evaluate the effectiveness of water quality management practices on water-dependent and semi-dependent SGCN, particularly those practices associated with permitting or mitigation actions.

3.3.2.15 Investigate the effectiveness of management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.3.2.20 Once a system is developed for reporting and qualifying new locations of invasive species, develop, implement and monitor/evaluate invasive species removal strategies at identified locations. Priority should be given to those areas critical to SGCN and/or contain unique and/or rare plant communities supporting SGCN and/or other fish/wildlife species.

3.5 Techniques development

3.5.1 Artificial propagation studies

3.5.1.1 Conduct studies to evaluate the impacts (beneficial and detrimental) of aquaculture on migratory shorebirds, waterfowl, finfish, shellfish and other SGCN and their habitats, including evaluation of the relative effects of location and aquaculture techniques.

3.5.1.2 Develop and conduct studies that evaluate relative efficacy and feasibility of management actions designed to minimize adverse impacts and enhance beneficial effects.

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.7 Develop/improve forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

3.5.3.8 Develop best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5.3.9 Develop strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.12 Develop management actions to minimize the documented adverse impacts and reduce risks of potential adverse impacts of aquaculture on migratory shorebirds and other SGCN, including waterfowl, finfish, and shellfish and their habitats.

3.5.3.14 Develop aquaculture practices in the coastal areas that are compatible with the recovery of SGCN.

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.3.19 Work with foresters to develop prescribed burning practices for Pinelands dependent species that increase or maintain habitat quality for these species in the Pinelands.

3.5.3.20 Develop guidance on various silviculture techniques for enhancing forests for forest-dependent SGCN.

3.5.3.22 Identify (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) and modify management strategies (e.g., timing restrictions for mowing, cooperative agreements with utility companies for maintenance of rights-of-ways), based on research, that maintain and enhance large existing areas of grassland in perpetuity.

3.5.3.23 Revise water quality management practices based on research on water-dependent and semi-dependent SGCN, particularly when associated with permitting or mitigation actions.

3.5.3.24 Based on research, modify management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.3.27 Conduct an assessment and develop a location list of available equipment for boom deployment during oil spills.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.2 Develop, implement, monitor and evaluate management strategies to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

3.5.4.4 Investigate the effects of mosquito control methods on freshwater aquatic and semi-aquatic SGCN including but not limited to, amphibian, fish, dragonfly, and damselfly populations.

3.5.4.5 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

3.5.4.6 Investigate the feasibility of mitigating for the impacts of contaminants to vulnerable wildlife, particularly SGCN. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.5.4.7 Investigate the feasibility and potential for success of conducting genetic rescue through translocation and/or reintroduction of animals into suitable habitat that was historically occupied to increase genetic diversity and reconnect isolated populations. Methods of investigation should include, but are not limited to, thorough literature reviews, expert opinions, identifying potential pitfalls (e.g., species' fidelity to their range or critical areas), and an examination of historic and current SGCN population distribution and suitable habitat availability.

3.5.4.12 Investigate and develop strategies to reduce "by-catch" of SGCN and other non-target species. Present findings and strategies to NJ DEP and conservation organizations for review and possible implementation. Develop a database documenting by-catch for use in management planning decisions.

3.5.4.14 Develop and implement agreements, and update existing agreements, with government agencies regarding the protection of critical SGCN habitats (e.g., significant breeding populations of beach nesting birds, colonial waterbird nesting areas, bat colonies, etc.).

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.17 Investigate new, non-invasive techniques for SGCN population evaluation through literature review, expert opinion, trial studies (if low risk), etc.

3.5.4.18 Investigate the effectiveness of survey techniques through selected "ground truthing" and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

3.5.4.21 Develop BMPs to address problematic species and diseases of unknown origin.

4 Education

4.1 Educator/Instructor training

4.1.0 Public education

4.1.0.1 Provide educational resources and training programs to private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

4.1.1 Aquatic resource education

4.1.1.1 Provide educational resources and training programs to teachers in aquatic resource education that includes information regarding climate change and sea-level rise for incorporation into the class curriculum and/or as the focus of school field trips.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.3 Secure and protect riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.4 Secure and protect fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.6 Secure and protect old-growth forest stands with large trees and/or stands that are approaching or being actively managed for old growth forests, in particular those within large, contiguous forest tracts, through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.7 Secure and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.8 Secure and protect scrub-shrub habitats for SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.3 Increase the protection of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through conservation area designations.

6.3.0.4 Promote the protection of fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through conservation area designations.

6.3.0.6 Promote the protection of old-growth forest stands with large trees and/or stands that are approaching or being actively managed for old growth forests, in particular those within large, contiguous forest tracts, through conservation area designations.

6.3.0.7 Promote the protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through conservation area designations.

6.3.0.8 Promote the protection of scrub-shrub habitats for SGCN through conservation area designations.

7 Law Enforcement

7.1 Law enforcement

7.1.4 Scale Unspecified

7.1.4.1 Improve enforcement of policies and/or regulations that promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

7.1.4.6 Recruit law enforcement to assist in the protection and enhancement of SGCN populations, in particular endangered species, through improved awareness of species through trainings, partnerships, and other methods. Information should include but is not limited to: 1) Issues concerning illegal collection of reptiles, 2) Persecution of rare snakes, 3) Illegal recreational activities on public lands (e.g., off-road vehicles) and their impact on wildlife, 4) Identification of sensitive areas, critical sites and/or "hot-spots" for collection.

7.1.4.9 Implement policies that improve and secure habitat connections between conserved SGCN habitats.

7.1.4.10 Implement policies that promotes expanding acreages and enhances the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.14 Implement policies that protect existing and developing old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

7.1.4.15 Implement policies that preserve and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

7.1.4.16 Implement policies that protect and restore riparian areas.

7.1.4.17 Improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

7.1.4.19 Implement policies that protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

7.1.4.20 Implement policies and/or regulations with the objective of reducing "by-catch" of SGCN and other non-target species.

7.1.4.26 Educate law enforcement personnel that there may be unauthorized research projects taking place and to encourage them to investigate any activities that appear to be harmful to wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.1 Coordinate research efforts among government agencies, non-government conservation partners and other stakeholders to investigate the impacts of aquaculture on migratory shorebirds, waterfowl, finfish, shellfish and other SGCN and their habitats, to determine relative effects of farming locations and aquaculture techniques, and to evaluate management actions to minimize such impacts.

8.1.0.2 Develop a team of personnel from government entities, conservation organizations and other stakeholders engaged in oil/gas spill response for marine and freshwater habitats to develop a feasible plan for oil spill response and/or to amend NJ's current oil spill response plan that clearly outlines each organizations responsibilities and an assessment and location list of available equipment for boom deployment during oil spills.

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.1.0.4 Engage government agencies, conservation partners and other stakeholders in constructive dialogues encouraging them to influence policy change and the creation of incentives through a habitat bill and/or municipal ordinances for backyard habitat.

8.1.0.10 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting sportsmen's organizations and fisheries, as well as public constituents, addressing the potential impacts of over-harvesting wildlife can have on the ecological system and to promote "sustainable harvest".

8.1.0.13 Engage DOD in a constructive dialogue regarding strategies to minimize disturbances to all SGCN (i.e., beyond their federal requirements) from forest management and other practices on their lands.

8.1.0.14 Engage DOD in a constructive dialogue regarding strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities.

8.1.0.15 Engage government agencies, conservation partners and other stakeholders in discussions encouraging and supporting the creation of laws and policies requiring vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

8.1.0.16 Engage local governments in discussions regarding the importance of them adopting/passing ordinances which require assessing and addressing secondary impacts (i.e., ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

8.1.0.17 Engage municipalities in constructive dialogue to identify and minimize destruction of areas prioritized for early succession forest management.

8.1.0.18 Engage NJDOT, NJ Transit Authority and other road management entities, wildlife conservation organizations/agencies (e.g., Division of Fish and Wildlife, New Jersey Conservation Foundation, Conserve Wildlife Foundation of NJ), and communities and citizens in discussions regarding the importance of and methods to enhance habitat connectivity, and work together to develop feasible strategies for ensuring that wildlife can disperse naturally and safely across roads and similar barriers to terrestrial and/or aquatic habitats.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.26 Coordinate across federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to woodland landowners to adopt or endorse consistent best management practices concerning controlled burns to maintain and/or improve forested habitat for wildlife.

8.1.0.27 NJ Division of Fish and Wildlife and their Game Council, and appropriate conservation partners and other stakeholders to review the freshwater fish code relative to SGCN or sensitive game species' populations and fecundity, and support amendments to the harvest quota or "bag limits" as needed.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.32 Work with NJ DEP's Water Management, other state agencies and watershed organizations to determine if mitigation is warranted at applicable power plants.

8.1.0.33 Engage government agencies, conservation partners and other land managers, communities, landowners, and commercial and industrial stakeholders in discussions regarding the importance of protecting and methods to protect priority wetlands beyond the levels afforded through regulation by maintaining and/or restoring optimal biological buffers around wetlands.

8.1.0.34 Work with the NJ Education Association and Department of Education to design curriculum and outdoor experimental learning opportunities, and provide training to teachers on implementation of these activities.

8.1.0.37 Enlist landowners and NJ citizens in the protection of and survey efforts for SGCN, in particular rare species, by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management and wildlife-related volunteer programs.

8.1.0.38 Engage partners, stakeholders and land managers in constructive dialogue promoting forest stewardship for SGCN that use core forests and forested corridors.

8.1.0.40 Encourage researchers, land managers, naturalists and enthusiasts to follow proper procedures for the coordination and/or permitting of research/management activities involving wildlife and sensitive habitats, and discourage activities that alter vegetation or wetlands, or cause harm or disturbance to wildlife.

8.1.0.44 Engage conservation partners, stakeholders, government agencies and other land stewards in constructive dialogues encouraging their inclusion of controlled burns in forest and other stewardship plans.

8.1.0.46 Form cooperative partnerships with dredging companies to facilitate habitat creation and enhancement within project areas, and to identify seasonal timing of activities that would minimize impacts to wildlife and their habitats.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.1.0.48 Form cooperative partnerships with transportation and shipment agencies and companies to facilitate habitat creation and enhancement away from and outside of project areas and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.1.0.49 Reduce the impacts of entrainment, impingement and thermal discharge at power plants by working with conservation partners, academia, etc. to ensure that best available technologies are utilized wherever possible.

8.2 Recruitment and retention activities

8.2.3 For wildlife watching

8.2.3.1 Develop and implement nature-focused tourism opportunities including wildlife viewing sites, interpretive signage highlighting unique ecosystems/habitats, and wildlife-related recreational opportunities that do not negatively impact SGCN or their habitats.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.1 Utilize WSFR grant funds, in combination with alternate funding sources as needed, to implement a scientific data-driven, extensive educational/outreach program targeting sportsmen's organizations and fisheries, as well as public constituents, addressing the potential impacts of over-harvesting wildlife can have on the ecological system and to promote "sustainable harvest".

8.3.0.2 Utilize WSFR grant funds, in combination with alternate funding sources as needed, to implement an extensive educational/outreach program consisting of displays, fliers, list-serve mailings, Facebook posts and speaking engagements with sportsmen's organizations and fisheries, as well as public constituents, addressing the unintended effects fishing gear and tackle can have on non-target species.

8.3.0.8 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate recreationists and encourage landowners to eliminate garbage in the vicinity of suitable wildlife habitat, in particular SGCN habitat. Information should include the detrimental impacts garbage may have on various wildlife species.

8.3.0.9 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners and land managers to include only native plants in landscaping and restoration projects. Provide information to assist them in detecting problematic establishment of invasive, non-indigenous plants.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.16 Develop an educational outreach program using a variety of media to ensure maximizing the distribution of information, in particular targeting sportsmen's organizations and fisheries, promoting "catch and release" and the impacts excessive harvests can have on wildlife populations.

8.3.0.17 Develop an educational outreach program using a variety of media to ensure maximizing the distribution of information, in particular targeting sportsmen's organizations and fisheries, promoting "sustainable harvest" using scientific data, and garner support from constituents through this outreach.

8.3.0.24 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

8.3.0.25 Develop educational outreach programs for landowners, nurseries and the general public regarding the negative impacts of invasive and non-native plants on our natural communities.

8.3.0.26 Develop educational outreach programs for private and public landowners and land managers regarding the importance of and how to manage core forests and forested corridors in a way that will be beneficial for SGCN, particularly endangered, threatened and special concern species.

8.3.0.27 Develop educational outreach programs for public and private landowners and land managers regarding the importance of structural habitat diversity, methods to increase diversity, and/or incentive programs available to increase habitat diversity.

8.3.0.28 Develop educational outreach programs for public and private landowners and land managers regarding the importance of managing grasslands for grassland-dependent species, methods of management, and/or incentive programs available.

8.3.0.29 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about the importance of maintaining a vegetative buffer along riparian and aquatic habitats to intercept storm water runoff and minimize soil erosion.

8.3.0.30 Develop educational outreach programs for private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.4 Develop a plan that directs the creation of new impoundments and/or the expansion of bogs for cranberry farming within or immediately adjacent to critical forested habitats in a manner that minimizes impacts on the natural hydrology of the watershed and subsequently, the natural wetlands in the area.

9.1.0.5 Develop a plan that directs the creation or expansion of energy or utility rights-of-way in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.6 Develop a plan that directs the creation or expansion of roads and railroads or the re-establishment of abandoned railroads within and adjacent to critical forested habitats in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.7 Develop a plan that directs the maintenance of or new channelization of forested streams and rivers in a manner that minimizes impacts of the aquatic ecological system and adjacent forest

9.1.0.8 Develop a plan that focuses on strategies for oil pipelines to avoid sensitive habitats that would be highly impacted by oil spills.

9.1.0.9 Develop a plan that focuses on strategies to minimize the creation of renewable energy farms (e.g., solar, wind) and related infrastructures within and their impacts on forested habitats and the wildlife community.

9.1.0.10 Develop a plan that focuses on strategies to minimize the impacts of mining on critical forested habitats.

9.1.0.11 Develop a plan that focuses on strategies to minimize the impacts of power plants on critical forested habitats and the wildlife community.

9.1.0.12 Develop a plan to avoid freshwater tidal management.

9.1.0.13 Develop a plan to minimize agriculture that would result in groundwater withdrawal in critical forested areas.

9.1.0.14 Develop a plan to minimize development that would result in groundwater withdrawal in critical forested areas.

9.1.0.15 Develop a plan to minimize fragmentation of terrestrial and aquatic habitats by roads.

9.1.0.16 Develop a plan to minimize new lawnscapes and preserve natural vegetation within and adjacent to critical forest areas.

9.1.0.17 Develop a plan to minimize nutrient and effluent loads from aquaculture practices.

9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

9.1.0.20 Develop a plan to minimize the impacts of existing agricultural properties adjacent to and the conversion of forest habitats (terrestrial and aquatic, within or adjacent to critical forests) to agriculture, grazing areas/livestock farms, and plantations.

9.1.0.21 Develop a plan to minimize the use of any-sized dam in critical forested areas.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.23 Develop a plan to mitigate the effects of transportation barriers by using CHANJ products.

9.1.0.24 Develop a plan to prevent livestock from entering water bodies in critical forested habitats.

9.1.0.25 Develop a plan to prevent the conversion of forested stream buffers to pastures in critical forested habitats.

9.1.0.26 Develop a plan to minimize any adverse impacts of aquaculture farming techniques and structures on freshwater and intertidal habitats.

9.1.0.27 Develop a plan to use wildlife-appropriate culverts in critical forested areas.

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.31 Develop wetland restoration plans that consider the life history and needs of wildlife occupying targeted habitats.

9.1.0.32 Incorporate aquatic habitat connectivity and water quality/effluent standards into local and state aquaculture plans and BMPs.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.5 Develop response plans to address disease outbreaks within wildlife populations, in particular SGCN.

9.3.1.6 Amend NJ's current oil spill response plan to 1) expand the geographic area addressed, 2) expand the targeted species impacted and in need of recovery, and 3) revise current and integrate new actions into the plan as needed.

9.3.1.7 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.10 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.14 Create species management plans that will promote the protection and where appropriate, the development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

9.3.1.15 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.1.16 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.1.19 Develop management strategies for freshwater SGCN fish and incorporate them into existing Freshwater Fisheries Management Plans.

9.3.1.20 Use compiled life history information on urban-associated SGCN regarding threats, breeding, fecundity, survival, habitat needs, wintering sites/roosts, migration routes and destinations, etc. to develop wildlife management strategies to benefit such species.

9.3.2 Listed species recovery planning

9.3.2.1 Develop proactive species recovery plans for all endangered and threatened species including guidance and objectives pertaining to critical and supporting habitat to meet and maintain recovery goals.

9.3.3 Habitat management planning

9.3.3.5 Develop a management plan using forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

9.3.3.6 Develop a management plan for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

9.3.3.7 Develop a management plan to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

9.3.3.8 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.3.9 Develop a response plan to outbreaks using BMPs to control infestations and limit their spread in a way that avoids excessive harm to non-target species.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.3.13 Develop a management plan that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas and prevents or ameliorates near-term impacts of climate change throughout the State, but in particular within the coastal and Delaware Bay areas.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.21 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.3.22 Create management plans to minimize and/or prevent wildlife road mortality that will incorporate wildlife passages in conjunction with barrier fencing and, where possible, seasonal closures. Aquatic-associated passages must avoid disturbance to the natural streambeds and riparian habitat, permit high volumes of water to flow freely, and provide adequate travel corridors for terrestrial wildlife, while maintaining stream flow for fish passage. Bridges that span rivers and streambeds and include floodplain habitat on either side of the span to provide travel corridors for terrestrial wildlife are preferred over culverts.

9.3.3.23 Create forest management plans that will promote the protection and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

9.3.3.24 Develop a plan to improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

9.3.3.28 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.3.29 Develop habitat management plans aimed at reducing or eliminating negative impacts of ORVs.

9.3.3.32 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3.34 Include controlled burn prescriptions in forest and stewardship plans to improve wildlife habitat.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

9.3.3.37 Develop management strategies for freshwater SGCN fish and incorporate them into existing Freshwater Fisheries Management Plans.

9.3.3.38 Use compiled life history information on urban-associated SGCN regarding threats, breeding, fecundity, survival, habitat needs, wintering sites/roosts, migration routes and destinations, etc. to develop habitat management strategies to benefit such species.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.3 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.9 Review strategies for creating or enhancing connectivity (e.g., installing appropriately-sized wildlife passages) between wetlands to allow wildlife to disperse naturally and safely.

11.1.1.10 Use CHANJ mapping in reviews of proposed energy, mining, transportation and utility service companies/agencies' projects to attempt to maintain habitat connectivity and reduce fragmentation, and identify potential impacts of the projects.

11.1.1.11 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed offshore energy projects relating to drilling, extraction and distribution of petroleum and gas products to reduce habitat destruction and minimize impacts on wildlife.

11.1.1.12 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed solar farm projects to reduce habitat fragmentation and minimize impacts on wildlife.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.2.2 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.2.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into the environmental review process to help establish policies and plans that minimize the impact of aquaculture on fish and wildlife.

11.1.2.4 Review strategies for creating or enhancing connectivity (e.g., installing appropriately-sized wildlife passages) between wetlands to allow wildlife to disperse naturally and safely.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.2 Provide technical support to public and private landowners and land managers for controlling invasive, native and non-native plant species in order to increase structural habitat diversity.

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.7 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on the importance of maintaining habitat connectivity, minimizing fragmentation, and the use of CHANJ products to help them target areas for such planning.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.11 Provide educational resources, training programs, and on-the-ground guidance to private and public landowners and land managers on the benefits of and for creating young forest and early succession habitat for SGCN.

11.2.0.12 Provide educational resources and technical support to public landowners and land managers for managing grasslands for grassland-dependent species.

11.2.0.13 Provide educational resources and technical support to public landowners, private landowners with sufficient acreage, and land managers to promote the protection and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

11.2.0.14 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters), and to enhance or restore biologically appropriate buffers.

11.2.0.15 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and landowners about the importance of retaining and in an effort to protect, create, enhance and/or restore vegetation along aquatic habitats.

11.2.0.16 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

11.2.0.18 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats.

11.2.0.19 Provide educational resources and technical support to public and private landowners and land managers to promote the protection and/or enhancement of scrub-shrub habitats for SGCN.

11.2.0.22 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

11.2.0.23 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to SGCN habitats to promote the protection and/or enhancement of those adjacent habitats to increase the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and that connect conserved SGCN habitats.

11.2.0.24 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers on how to manage vegetated roadside areas (e.g., mowing, brush-hogging, etc.) on a schedule that avoids peak activity periods for wildlife and therefore, minimizes harm.

11.2.0.25 Provide educational resources, training programs, and on-the-ground guidance to resource managers regarding the assessment of and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) related to residential and commercial development.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.1 Engage partners and stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.3 Provide educational resources, training programs, and on-the-ground guidance to DOD to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop and implement forest management and other practices that minimize disturbances to SGCN (i.e., beyond their federal requirements).

11.2.1.4 Provide educational resources, training programs, and on-the-ground guidance to dredging companies and resource managers on habitat creation and enhancement away from and outside of shipping lanes, and to identify seasonal timing of activities that would minimize impacts to wildlife and their habitats.

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

100 Law and Policy

100. Legislation

100.1.3 Sub-national Level

100.1.3.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.3.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.4 County and Local

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.3 Expand the acreages and enhance the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN through local ordinances.

100.1.4.4 Secure wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and biologically appropriate buffers through local ordinances.

100.1.4.5 Secure SGCN-inhabited/used freshwater wetlands and biologically appropriate buffers through local ordinances.

100.1.4.6 Secure fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through local ordinances.

100.1.4.9 Secure existing and developing old-growth forest stands with large trees, in particular those within large, contiguous forest tracts, through local ordinances.

100.1.4.10 Secure critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through local ordinances.

100.1.4.11 Secure riparian areas through local ordinances.

100.1.4.12 Secure scrub-shrub habitats for SGCN through local ordinances.

100.1.4.14 Adopt/pass local ordinances which require assessing and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.5.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.5.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into state/local policy to minimize the impact of aquaculture on fish and wildlife.

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100.1.5.5 Develop legislation to provide financial support for the New Jersey Invasive Species Strike Team.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.1 Develop (and/or improve) policies and/or regulations that will promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

100.3.0.5 Develop policies that will promote improved and secure habitat connections between conserved SGCN habitats.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.11 Develop policies that will ensure the protection and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

100.3.0.12 Develop policies that promote the preservation and protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.13 Develop policies that will promote protecting and restoring riparian areas.

100.3.0.14 Develop policies and/or regulations that increase the protective buffers of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) to biologically appropriate distances to benefit SGCN that rely upon these habitats and improve the function of the [associated] aquatic systems.

100.3.0.15 Develop policies that promote protecting and restoring scrub-shrub habitats to benefit shrub-dependent SGCN.

100.3.0.17 Develop and implement policies and/or regulations with the objective of reducing "by-catch" of SGCN and other non-target species.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.21 Develop policies that minimize wildlife road mortality through: 1) Requiring the integration of wildlife passages into all new and repaired roads, in particular those areas that will connect SGCN habitats, 2) Requiring current fish/wildlife passages be improved and maintained in perpetuity, 3) Supporting seasonal road closures, in particular for unimproved roads, 4) Supporting projects that work to improve connectivity of SGCN habitats such as land conservation through acquisition or other means.

100.3.0.22 Develop regulations that will protect urban-associated SGCN (restricting human access, buffering sensitive areas with postings, noise and/or light restrictions) in sensitive areas and/or during sensitive periods such as breeding, etc.

100.3.0.25 Amend the harvest quota or "bag limits" within the freshwater fish code relative to SGCN or sensitive game species' as needed.

100.3.0.26 Adopt regulations requiring the combined sewer overflow alternative analyses required by regulation address potential impacts to wildlife in watercourses or receiving water bodies.

100.3.0.31 Create or expand tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMPs.

100.3.0.32 Coordinate regulations across agencies to maximize availability of and enrollment in existing Forestry Stewardship Programs (e.g., "Woodland Stewards", Farm Bill, partners, etc.) to maintain and/or improve forest habitat.

100.3.0.33 Adopt additional timing restrictions, and any necessary permit conditions, into the Administrative Code for NJ DEP-permitted projects to minimize impacts on freshwater SGCN fish, in particular, within habitats during their vulnerable periods as identified through a thorough review of available information.

100.3.0.35 Incorporate Freshwater Fish Status Assessment (Delphi Technique) results pertaining to endangered and threatened species into regulations.

100.3.0.37 Develop a law and/or policy that requires NJ DEP to continue to address and correct the allowable combined sewer overflow inputs of solid waste into the marine environment to minimize harm to wildlife and their habitats.

100.3.0.38 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.3.0.39 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.3.0.40 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.

100.3.0.42 Fully adopt the former Storm water Management Rules' 300ft buffer requirements into the Flood Hazard Area Control Act Rules.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.48 Propose new State law or regulation mandating that a State-level "development impact fee" be assessed on all new development approved by municipalities (via the Municipal Land Use Law processes), and dedicate such monies to the development and implementation of regional Habitat Conservation Plans (or existing plans/programs serving the same regional function).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.53 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded rights-of-way corridors associated with energy transport/transmission.

100.3.0.54 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded surface mining areas.

100.3.0.55 Develop regulations to address potentially adverse effects of aquaculture on SGCN species and their habitats.

100.3.0.57 Develop regulations that when implemented will improve and secure habitat connections between conserved SGCN habitats.

100.3.0.58 Develop regulations that when implemented will promote the expansion of acreages and enhancement of the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.62 Develop regulations that when implemented will protect existing old-growth forest stands with large trees and/or stands that are being actively managed for old growth forests, in particular those within large, contiguous forest tracts.

100.3.0.63 Develop regulations that when implemented will preserve and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.64 Develop regulations that when implemented will protect and restore riparian areas.

100.3.0.65 Develop regulations that when implemented will protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

100.3.0.66 Develop regulations with the objective of reducing "by-catch" of SGCN and other non-target species.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.2 Create a policy that requires the NJ DEP to incorporate scientific information regarding climate change and sea level rise (e.g., predictions, habitat management/acquisition efforts to enhance resilience to inundation) on their websites and to work with other government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

100.4.0.3 Develop policies for mandatory buffer strips on preserved farmlands and state-owned agricultural lands.

100.4.0.4 Create a policy that requires the use of wildlife habitat and corridor mapping products for both regulatory use when conducting project reviews and planning/siting new or expanded rights-of-way projects.

100.4.0.8 Develop a white paper addressing the impacts that existing, new or expanded rights-of-way have upon wildlife, wildlife habitats and habitat connectivity.

100.4.0.9 Develop and implement policies to minimize the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats in order to benefit wildlife.

100.4.0.12 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.4.0.13 Develop policies for different circumstances (e.g., roadsides and medians, riparian, aquatic and terrestrial habitats) that outline appropriate habitat/vegetation management strategies and schedules to minimize risks to and benefit wildlife.

100.4.0.16 Develop policies to implement habitat management strategies that will increase the structural diversity surrounding areas used for energy, mining, and transportation and service corridors which include but are not limited to the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-

100.4.0.17 Develop policies to implement habitat management strategies, including prescribed burns, that will increase the structural diversity on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies to control and reduce the impacts of invasive, non-native species in order to increase structural habitat diversity.

100.4.0.18 Develop policies to minimize the extent of infrastructure associated with energy and service corridors or areas (e.g., wind and solar farms, pipelines, utility lines) and that require the implementation of habitat management strategies that will increase the structural diversity in the area including (e.g., the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides).

100.4.0.19 Develop regulations that will minimize the creation of new barriers, remove or replace current barriers with appropriately-sized systems to accommodate wildlife dispersal, and to minimize road widening and traffic volume increases within critical wildlife habitat areas.

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.21 Ensure that Section 303(d) of the Clean Water Act and applicable State statutory/regulatory requirements for surface water pollutant budgets are being met by monitoring and enforcing regulatory Total Maximum Daily Load (TMDL) targets established within regional Water Quality Management Plans.

100.4.0.22 Work with NJ DEP's Division of Land Use Regulation to ensure protection of listed species and their habitats during stream cleaning events.

100.4.0.23 Adopt additional timing restrictions, and any necessary permit conditions, into the Administrative Code for NJ DEP-permitted projects to minimize impacts on freshwater SGCN fish, in particular, within habitats during their vulnerable periods as identified through a thorough review of available information.

100.4.0.24 Develop policies to provide financial support for the New Jersey Invasive Species Strike Team.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Vulnerable Minnows

Focal species that comprise this Conservation Target:

Bridle Shiner | Comely Shiner | Ironcolor Shiner

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:

- 1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.1.1.2 Loss, alteration and/or degradation of habitat.
- 1.1.1.5 Impervious surfaces can lead to a decrease in water recharge.
- 1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.
- 1.1.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:

- 1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.2.1.2 Loss, alteration and/or degradation of habitat.
- 1.2.1.5 Impervious surfaces can lead to a decrease in water recharge.
- 1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.
- 1.2.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats:

- 1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.3.1.2 Loss, alteration and/or degradation of habitat.
- 1.3.1.4 Impervious surfaces can lead to a decrease in water recharge.
- 1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.
- 1.3.1.6 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture (Avg. Score: 1.00)

NJ Specific Threats: 2.1.1.3 Conversion of agricultural landscape that results in increased erosion, runoff, and chemical and thermal pollution decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.1.2 Small-holder Farming (Avg. Score: 1.00)

NJ Specific Threats: 2.1.2.2 Fragments terrestrial and aquatic habitats.

2.1.3 Agro-industry (Avg. Score: 1.00)

NJ Specific Threats: 2.1.3.2 Fragments terrestrial and aquatic habitats.

2.3 Livestock Farming and Ranching

2.3.2 Small-holder Grazing (Avg. Score: 1.00)

NJ Specific Threats: 2.3.2.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.2.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

2.3.3 Agro-industry Grazing (Avg. Score: 1.00)

NJ Specific Threats: 2.3.3.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.3.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

2.4 Marine and Freshwater Aquaculture

2.4.1 Subsistence/Artisinal Aquaculture (Avg. Score: 1.00)

NJ Specific Threats: 2.4.1.3 Potential for increased nutrient and effluent loads.

2.4.1.7 Potential for fish to escape and compete with, predate upon, interbreed with, or spread disease to SGCN fish species.

2.4.2 Industrial Aquaculture (Avg. Score: 1.00)

NJ Specific Threats: 2.4.2.3 Potential for increased nutrient and effluent loads.

2.4.2.7 Potential for fish to escape and compete with, predate upon, interbreed with, or spread disease to SGCN fish species.

3 Energy Production and Mining

3.1 Oil and Gas Facilities and Pipelines

3.1.1 Distribution processes of petroleum and other liquid hydrocarbons (Avg. Score: 2.00)

NJ Specific Threats: 3.1.1.2 Loss, alteration and/or degradation of habitat.

3.1.1.3 Increased risk of oil spills.

3.1.2 Natural gas distribution processes (Avg. Score: 2.00)

NJ Specific Threats: 3.1.2.1 Fragments terrestrial and aquatic habitats.

3.1.2.2 Loss, alteration and/or degradation of habitat.

3.1.2.3 Increased risk of gas leaks and explosions.

3.2 Mining and Quarrying

3.2.2 Surface Mining - Rock Quarry (and sand quarries) (Avg. Score: 1.00)

NJ Specific Threats: 3.2.2.1 Fragments terrestrial and aquatic habitats.

3.2.2.2 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

3.4 Conventional Power Plants

3.4.0 Conventional Power Plants (Avg. Score: 2.00)

NJ Specific Threats: 3.4.0.2 Loss, alteration and/or degradation of habitat due to new or the expansion of current facilities.

3.4.0.3 Alteration of the temperature, pH and/or hydrology of aquatic ecosystems change plant communities and can harm wildlife and/or impact their behavior and survivorship.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats: 4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads (Avg. Score: 1.00)

NJ Specific Threats: 4.2.1.4 Lines that cross or run parallel to streams result in a loss or reduction of vegetated riparian buffers and streamside shading, affecting water quality and in-stream habitat for aquatic biota.

4.3 Shipping Lanes

4.3.2 Dredging impacts (Avg. Score: 1.00)

NJ Specific Threats: 4.3.2.1 Threatens wildlife by disrupting/removing stream bottom habitat.

5 Biological Resource Use

5.2 Gathering Terrestrial Plants

5.2.3 Control (Avg. Score: 1.00)

NJ Specific Threats: 5.2.3.3 Removal of riparian or near-stream vegetation alters water quality and in-stream habitat for aquatic organisms by reducing streamside shading, increasing bank erosion, and affecting the natural filtering ability of trees, shrubs, and grasses.

5.3 Logging and Wood Harvesting

5.3.1 Intentional Use (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.1.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.2 Intentional Use (large scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.2.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.3 Unintentional effects (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.3.2 Poorly planned/implemented tree harvesting adjacent to waterways and vernal pools can lead to increased water temperatures, soil erosion and sedimentation, and reduces the potential for woody debris within the aquatic system, leading to negative impacts on wildlife.

5.3.4 Unintentional effects (large scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.4.3 Poorly planned/implemented tree harvesting adjacent to waterways and vernal pools can lead to increased water temperatures, soil erosion and sedimentation, and reduces the potential for woody debris within the aquatic system, leading to negative impacts on wildlife.

5.3.4.4 Infrastructure and/or equipment use may result in subtle changes to drainage patterns, adversely affecting vernal pool and wetland hydrology.

5.4 Fishing and Harvesting of Aquatic Resources

5.4.1 Intentional Use (subsistence/small scale) (Avg. Score: 1.67)

NJ Specific Threats: 5.4.1.3 Collection of fish for food, bait, or aquarium trade can lead to population exploitation.

5.4.1.4 Illegal collection of aquatic and semi-aquatic wildlife can have detrimental impacts on populations.

5.4.2 Intentional Use (large scale) (Avg. Score: 1.67)

NJ Specific Threats: 5.4.2.2 Collection of fish for food, bait, or aquarium trade can lead to population exploitation.

5.4.3 Unintentional effects (subsistence/small scale) (Avg. Score: 3.00)

NJ Specific Threats: 5.4.3.4 Fish introduced for sport fishing can negatively impact native species by competing for resources and/or altering the habitat (e.g., disrupting benthic communities and/or severely impacting aquatic vegetation).

5.4.3.7 Improperly sanitized equipment, relocation of fish, importation and release of non-native species, and the use of bait from a different location can spread invasive species and diseases from one waterbody to another.

5.4.4 Unintentional effects (large scale) (Avg. Score: 3.00)

NJ Specific Threats: 5.4.4.1 Fish introduced for sport fishing can negatively impact native species by competing for resources and/or altering the habitat (e.g., disrupting benthic communities and/or severely impacting aquatic vegetation).

5.4.4.7 Improperly sanitized equipment, relocation of fish, use of bait from a different location, can spread invasive species and diseases from one waterbody to another.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized) (Avg. Score: 1.00)

NJ Specific Threats: 6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.

6.3 Work and Other Activities

6.3.1 Unauthorized research projects at significant habitats (Avg. Score: 1.00)

NJ Specific Threats: 6.3.1.1 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.1.2 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.1.4 Illegal transfer of freshwater fish from one waterbody/watershed to another can result in the spread of non-native, invasive and/or undesirable fish or mussel species and/or diseases.

6.3.2 Authorized research projects at significant habitats (Avg. Score: 1.00)

NJ Specific Threats: 6.3.2.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.2.3 Accidental trampling of nests, eggs/egg masses, and unseen individuals may impact reproductive success or cause direct mortality to SGCN.

6.3.2.5 Authorized transfer of freshwater fish from one waterbody/watershed to another can result in the spread of non-native, invasive and/or undesirable fish or mussel species and/or diseases.

6.3.3 Other "work" unrelated to research (Avg. Score: 1.00)

NJ Specific Threats:

6.3.3.1 Construction projects may disrupt normal wildlife behavior which can result in reduced reproductive success or survival, abandonment of critical sites, etc. (e.g., bridge-nesting birds).

6.3.3.4 Workers may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.3.5 Unauthorized manipulation of water level (for dam repair, dredging, aquatic vegetation control, etc.) particularly during spawning season or during the summer when temperatures are high and dissolved oxygen is low can have negative impacts on fish and fish habitat.

7 Natural Systems Modifications

7.2 Dams and Water Management/Use

7.2.1 Abstraction of Surface Water (domestic use) (Avg. Score: 3.00)

NJ Specific Threats:

7.2.1.1 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.1.2 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.1.3 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, and eliminates shallow water habitats.

7.2.1.4 Water intake systems associated with municipal water supply threaten aquatic organisms due to injury or mortality from impingement and/or entrainment.

7.2.2 Abstraction of Surface Water (commercial use) (Avg. Score: 3.00)

NJ Specific Threats:

7.2.2.1 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, eliminates shallow water habitats, and disrupts/removes stream bottom habitat.

7.2.2.2 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.2.3 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.2.4 Water intake systems associated with industrial use and power plants threaten aquatic organisms due to injury or mortality from impingement and/or entrainment.

7.2.3 Abstraction of Surface Water (agricultural use) (Avg. Score: 3.00)

NJ Specific Threats:

7.2.3.1 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.3.2 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, and eliminates shallow water habitats.

7.2.3.3 Impounding water to create or expand bogs for cranberry farming leads to the loss of natural wetlands and the alteration of the natural hydrology in the area.

7.2.3.4 Water intake systems associated with agriculture threaten aquatic organisms due to injury or mortality from impingement and/or entrainment.

7.2.3.5 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.5 Abstraction of Ground Water (domestic use) (Avg. Score: 3.00)

NJ Specific Threats: 7.2.5.1 Heavy withdrawal of ground water for domestic use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.6 Abstraction of Ground Water (commercial use) (Avg. Score: 3.00)

NJ Specific Threats: 7.2.6.1 Heavy withdrawal of ground water for industrial and commercial use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.7 Abstraction of Ground Water (agricultural use) (Avg. Score: 3.00)

NJ Specific Threats: 7.2.7.1 Heavy withdrawal of ground water for agricultural use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.9 Small Dams (Avg. Score: 2.00)

NJ Specific Threats: 7.2.9.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.9.2 Dams act as a barrier to fish movement, limiting the distribution of anadromous fish and fish that act as hosts for mussels.

7.2.9.3 Dams act as a barrier to movement, limiting the ability of aquatic or semi-aquatic wildlife to move safely between habitats.

7.2.10 Large Dams (Avg. Score: 3.00)

NJ Specific Threats: 7.2.10.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.10.2 Dams act as a barrier to fish movement, limiting the distribution of anadromous fish and fish that act as hosts for mussels.

7.2.10.3 Dams act as a barrier to movement, limiting the ability of aquatic or semi-aquatic wildlife to move safely between habitats.

7.2.11 Dams (size unknown) (Avg. Score: 2.00)

NJ Specific Threats: 7.2.11.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.11.2 Dams act as a barrier to fish movement, limiting the distribution of anadromous fish and fish that act as hosts for mussels.

7.2.11.3 Dams act as a barrier to movement, limiting the ability of aquatic or semi-aquatic wildlife to move safely between habitats.

7.2.12 Culverts (Avg. Score: 2.00)

NJ Specific Threats: 7.2.12.1 Improper design, placement, installation and maintenance of culverts and other stream crossing structures can impede or prevent the movements of terrestrial organisms and can restrict or limit stream flow, impeding the movement of aquatic organisms along riparian corridors.

7.2.13 Stream Burial (Avg. Score: 1.00)

NJ Specific Threats: 7.2.13.1 Eliminates riparian habitats.

7.2.13.2 Eliminates in-stream habitat and water resources for wildlife.

7.2.13.3 Alters the hydrology and quality of downstream aquatic and riparian habitats.

7.3 Other Ecosystem Modifications

7.3.1 Shoreline Stabilization (Avg. Score: 1.00)

NJ Specific Threats: 7.3.1.2 Efforts to stabilize stream corridors, particularly near roads and infrastructure, in which vegetated and dynamic shorelines are replaced with unvegetated and rigid structures such as rip-rap, gabion, concrete raceways and bulkheads interfere with fish spawning, nursery and foraging areas.

7.3.3 Removal of coarse woody debris (streams, forests, scrub-shrub habitats) (Avg. Score: 3.00)

NJ Specific Threats: 7.3.3.1 Decreases the available detritus that normally accumulates behind and within stream obstructions, minimizing or eliminating food sources and shelters for fishes, invertebrates and amphibians.

7.3.3.2 Decreases habitat and/or corridor suitability due to limited or absent shelter and foraging habitat.

7.3.3.4 Decreases available basking, shelter, and foraging habitats.

7.3.5 Poor habitat management (Avg. Score: 2.00)

NJ Specific Threats: 7.3.5.2 Shifting from natural vegetation to lawns can cause increased temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

7.3.5.4 Vegetation clearing or inappropriate alteration adjacent to aquatic habitats threatens aquatic species by degrading habitat and water quality (altering temperature and dissolved oxygen, increasing siltation and desiccation, etc.).

7.3.5.8 Storm water outfall pipes can create habitats in small streams that are conducive to non-native predatory fish which can negatively impact native fish species.

7.3.5.9 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, eliminates shallow water habitats, and disrupts/removes stream bottom habitat.

7.3.5.10 Ditching, draining and filling of marshes and wetlands eliminates habitat and degrades the remaining surrounding areas for wildlife.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species (Avg. Score: 3.00)

NJ Specific Threats: 8.1.1.1 Displace or outcompete native species for resources.

8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.

8.1.1.4 Invasive, non-native animals increase the risk of predation on native animals and/or herbivory on native vegetation.

8.1.2 Invasive non-native aquatic animals (Avg. Score: 3.00)

NJ Specific Threats: 8.1.2.2 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminishing habitat suitability and reducing ecological integrity of natural communities, and may introduce disease into a population.

8.1.3 Invasive non-native aquatic plants (Avg. Score: 3.00)

NJ Specific Threats: 8.1.3.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.6 Invasive non-native fungal/bacterial diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.1.6.1 The introduction of non-native fungal and bacterial diseases threatens native populations and ecosystems.

8.2 Problematic Native Species/Diseases

8.2.2 Named Species (Avg. Score: 1.00)

NJ Specific Threats: 8.2.2.2 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.3 Introduced Genetic Material

8.3.0 Introduced Genetic Material (Avg. Score: 1.00)

NJ Specific Threats: 8.3.0.1 Introduction of farm-reared species (e.g., bobwhite and brook trout) for hunting and fishing purposes introduces genetic material into the native population when species hybridize.

8.3.0.2 Species hybridizing as a result of the alteration of, and subsequent connectivity of, habitats that once separated species.

8.4 Problematic Species/Diseases of Unknown Origin

8.4.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.4.1.1 Non-native or poorly understood diseases and parasites could potentially impact native animals.

8.5 Viral/Prion-induced Diseases

8.5.2 Named Species (Disease) (Avg. Score: 3.00)

NJ Specific Threats: 8.5.2.2 Viral Hemorrhagic Septicemia (VHS) (recently introduced into the Great Lakes) has caused mortality in 30 common fish species across many families. Although many of the fish SGCN have not been tested, it is hypothesized that they may be vulnerable. If introduced into NJ, VHS is predicted to cause widespread fish kills.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.1 Domestic and Urban Waste Water

9.1.1 Sewage (Avg. Score: 2.00)

NJ Specific Threats: 9.1.1.1 Degradation of aquatic and marine water quality and habitats by changing turbidity, flow and water chemistry.

9.1.1.2 Leads to increased eutrophication and algae blooms that result in oxygen depletion.

9.1.1.3 Contaminants in sewage treatment effluents and Combined Sewer Overflows can cause developmental and behavioral abnormalities and reproductive failure in wildlife.

9.1.2 Run-off (Avg. Score: 2.00)

NJ Specific Threats: 9.1.2.1 Chemical fertilizers and nutrient run-off changes the pH in streams and ponds and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.1.2.2 Contaminants degrade aquatic and marine water quality and can bioaccumulate in benthic organisms, threatening wildlife by causing developmental and behavioral abnormalities and reproductive failure.

9.1.2.3 Contaminants from road runoff (oil, sediment, salt, etc.) impact native vegetation and the species that rely upon them, degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2 Industrial and Military Effluents

9.2.1 Oil Spills (Avg. Score: 3.00)

NJ Specific Threats: 9.2.1.1 Oil spills render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.1.2 Oil spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.1.3 Oil spills cause external oiling of wildlife and ingestion of oil, both of which can injure or kill wildlife.

9.2.2 Seepage from Mining (Avg. Score: 1.00)

NJ Specific Threats: 9.2.2.1 Contaminants from mining degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2.3 Other (Avg. Score: 2.00)

NJ Specific Threats: 9.2.3.1 Point and nonpoint source pollution such as polychlorinated biphenyls (PCBs), pesticides, heavy metals, and endocrine disrupting compounds (EDC's) into freshwater and marine systems pose threats to wildlife through direct contact and/or ingestion, and to aquatic species and their predators through bioaccumulation, impacting the reproductive success and neurological function of many avian and fish species.

9.2.3.2 Chemical spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.3.3 Chemical spills may render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.4 Other: Hydrofracturing (Avg. Score: 1.00)

NJ Specific Threats: 9.2.4.1 Contaminants from hydrofracturing degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2.4.2 Uncontrolled effluents escaping from hydrofracturing facilities can cause injury to wildlife and alter normal behaviors.

9.2.5 Other: Industrial toxic settling ponds (Avg. Score: 1.00)

NJ Specific Threats: 9.2.5.1 Surficial or open industrial effluent ponds can cause injury or death to wildlife that become exposed through ingestion or submersion.

9.3 Agricultural and Forestry Effluents

9.3.1 Nutrient Loads (Avg. Score: 2.00)

NJ Specific Threats: 9.3.1.1 Chemical fertilizers and nutrient run-off changes the pH in streams, ponds and wetlands and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.3.1.2 Animal waste degrades terrestrial and aquatic habitats, especially streams, ponds and wetlands, resulting in eutrophication, which disrupts oxygen and nutrient balances, and causes injury and mortality to aquatic organisms.

9.3.1.4 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades wetland and aquatic habitats with runoff, increasing sediment and nutrient loads and pH.

9.3.1.5 Conversion of native forests to plantations degrades wetland and aquatic habitats through increased runoff.

9.3.2 Soil Erosion and Sedimentation (Avg. Score: 3.00)

NJ Specific Threats: 9.3.2.1 Soil erosion, sedimentation and destruction of streambanks and riparian buffers degrade waters making them unsuitable for riparian-dependent wildlife.

9.3.2.3 Conversion of native forests to plantations degrades wetland and aquatic habitats through increased sedimentation.

9.3.3 Herbicides and Pesticides (Avg. Score: 2.00)

NJ Specific Threats: 9.3.3.1 Pesticides degrade terrestrial and aquatic habitats, especially streams, ponds and wetlands. Aquatic wildlife are particularly sensitive to these contaminants, which can cause developmental and behavioral abnormalities and reproductive failure. Some contaminants may bioaccumulate in predatory fish and birds and disrupt reproduction.

9.3.3.3 Use of pesticides can directly harm non-target species through direct contact and/or by reducing and/or contaminating their food supply.

9.3.4 Other (Avg. Score: 2.00)

NJ Specific Threats: 9.3.4.1 Spills, leaks or discharges of fuel, oil or other contaminant fluids from machinery or equipment used in the normal course of agricultural or forestry activities can degrade or destroy adjacent aquatic and terrestrial habitats and/or cause harm to non-target species (plants and animals).

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture (Avg. Score: 2.00)

NJ Specific Threats: 9.3.5.1 Use of pesticides, insecticides, and/or herbicides can directly harm non-target species, such as amphibians and beneficial invertebrates through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5.4 Improper use of current insecticides, such as those containing esfenvalerate, prallethrin, or piperonyl butoxide, or past use of pesticides containing chlordane still present in the soils, are toxic to various wildlife species, and can cause injury, mortality, or other effects that impair population viability.

9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.4 Garbage and Solid Waste

9.4.1 Direct hazards to wildlife (Avg. Score: 1.00)

NJ Specific Threats: 9.4.1.2 Garbage and solid waste destroys natural habitats and obstructs wildlife movements.

9.5 Air-Bourne Pollutants

9.5.1 Acid Rain (Avg. Score: 1.00)

NJ Specific Threats: 9.5.1.2 Leaches calcium from the soils which in turn reduces the availability of prey, particularly calcium-rich prey such as snails.

9.5.4 Other (Avg. Score: 1.00)

NJ Specific Threats: 9.5.4.1 Dust and/or airborne sedimentation from construction sites, agricultural operations or related earth disturbances can introduce mineral or organic sediments into adjacent wildlife habitats, degrading their quality and suitability for wildlife short-term and/or long-term.

9.5.6 Herbicides and Pesticides (Avg. Score: 2.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

9.6 Excess Energy

9.6.2 Thermal Pollution (Avg. Score: 1.00)

NJ Specific Threats: 9.6.2.1 Water temperature changes due to industrial discharge of heated water may impact species composition in the receiving waterbody. Species such as sea turtles and migrating fish may be attracted to the thermal plume and become more vulnerable to mortality during emergency shutdowns during cooler months.

9.6.2.2 Water temperature changes to aquatic systems can deter or preclude use by SGCN (e.g., alter habitat suitability for wildlife species, reduce prey base) or present stressors that are harmful if not fatal to wildlife.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 3.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.2 Droughts

11.2.1 Droughts (Avg. Score: 2.00)

NJ Specific Threats: 11.2.1.1 Contribute to hardened soils, decreasing water recharge during rains and increasing the likelihood of flash floods during storms.

11.2.1.2 Lead to lower groundwater levels and therefore, less available water for people and habitats.

11.2.1.3 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

11.3 Temperature Extremes

11.3.1 Temperature extremes (Avg. Score: 2.00)

NJ Specific Threats: 11.3.1.1 Increasing temperatures may cause habitat loss and degradation by desiccating and/or raising the temperatures of small wetlands and streams leading to the loss of freshwater mussels and other aquatic species and species reliant upon these habitats.

11.3.1.2 Increased temperatures can negatively impact wetland, riverine, lacustrine and vernal pool-associated or -dependent wildlife by reducing flows, increasing water temperatures, lowering water levels and causing premature drying of vernal habitats.

11.4 Storms and Flooding

11.4.1 Storms and flooding (Avg. Score: 2.00)

NJ Specific Threats: 11.4.1.1 Extreme storms and flooding events threaten aquatic and marine wildlife through habitat degradation and alteration, including alterations to off-shore or back-bay benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic and marine wildlife.

11.4.1.3 Increase risk of saltwater intrusion to freshwater habitats altering the water chemistry and potentially altering aquatic wildlife community.

11.4.1.4 Flood events alter river or stream morphology, benthic conditions and habitat availability for wildlife, cause bank erosion, and deposit sediments in floodplain wetlands altering wildlife habitat.

11.4.2 Increased rainfall (Avg. Score: 2.00)

NJ Specific Threats: 11.4.2.1 Extreme rain events threaten aquatic wildlife through habitat degradation and alteration, including alterations to benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic wildlife.

11.6 Phenology Shifting or Alteration

11.6.2 Phenology shifts related to predator-prey ecology (Avg. Score: 1.00)

NJ Specific Threats: 11.6.2.1 Alters inter-specific relationships (e.g., competition, parasitism, predation) of wildlife, ultimately leads to detrimental impacts on the ecological system.

11.6.2.2 Shifts timing of species migration, breeding and hibernation, and available food resources, causes redistribution of species, or mortality for species that are unable to relocate due to their already isolated habitat or limited mobility.

11.6.3 Phenology shifts related to species redistribution (Avg. Score: 3.00)

NJ Specific Threats: 11.6.3.1 Shifts in timing of species migration, breeding and hibernation, and available food resources, as a result of wildlife range shifts driven by climate change.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 3.00)

NJ Specific Threats: 12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.2 Lack of up-to-date existing information (Avg. Score: 3.00)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.3 Need to answer research question (Avg. Score: 2.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.4 Need to develop new technique (Avg. Score: 1.00)

NJ Specific Threats: 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 1.00)

NJ Specific Threats: 12.3.0.2 Delays between State species status reviews and regulation amendments to incorporate the findings leads to extended periods when imperiled species do not receive the benefit of land use and other regulatory protections.

12.3.0.4 The NJ Administrative Code (N.J.A.C.) fails to protect native, freshwater fish species from collection and/or their use as bait.

12.3.0.5 NJDEP land use regulations provide no protection for spawning habitats of native, freshwater fish that are identified as candidates for State endangered, threatened, or special concern status.

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 1.00)

NJ Specific Threats: 12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 2.00)

NJ Specific Threats: 14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 2.00)

NJ Specific Threats: 14.2.1.2 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various aquatic and riparian management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 1.00)

NJ Specific Threats: 15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.4 Secure and promote the protection, restoration, and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts through incentive programs.

1.2.1.5 Secure and promote the protection/restoration of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through incentive programs.

1.2.1.6 Secure and promote the protection/restoration of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers through incentive programs.

1.2.1.7 Secure and promote the protection/restoration of fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.9 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing Forestry Stewardship Programs.

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.12 Create incentives (non-monetary and/or monetary) for land developers to redevelop abandoned areas (e.g., shopping centers, office complexes) to minimize the loss of natural habitats and reduce the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.14 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of herbicides and pesticides, and implementing more ecologically safe strategies when using such products.

1.2.1.16 Create incentives (non-monetary and/or monetary) within State regulations (mitigations requirements or credit, BMP satisfaction, etc.) to promote the use of retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.17 Develop a public-relations oriented certification program for private retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.18 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and land managers to control and reduce the impacts of invasive, native and non-native species in order to increase structural habitat diversity.

1.2.1.22 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to horse/livestock farm owners and managers to increase structural habitat diversity in and around the farms by managing vegetation for a variety of species, in particular, farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

1.2.1.23 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to provide cost shares and/or plan approvals for management based on management approaches and prescriptions.

1.2.1.25 Create incentives (non-monetary and/or monetary) within State regulations to assist and programs to deliver those incentives to aquaculture growers to relocate, for example, from intertidal to subtidal lease areas through buyouts of leases or microloans, and/or promoting on-lease conservation measures used by aquaculture growers (such as the implementation of conservation easements, use of living shorelines, incorporation of BMPs for habitat protection, etc.) for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

2 Direct Management of Natural Resources

2.2 Dam and barrier removal

2.2.1 Culvert work

2.2.1.1 Replace existing barriers to wildlife movement with and/or install appropriately-sized systems to accommodate wildlife dispersal.

2.2.5 Obstruction removal

2.2.5.1 Enhance fish SGCN habitats by removing obstructions to fish passage to benefit those species.

2.6 Hazard or infrastructure removal

2.6.6 Shoreline armoring removal

2.6.6.1 Remove shoreline armoring to reduce its impacts on aquatic habitats.

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.1 Control invasive insect infestations by implementing BMP strategies through biological, chemical and/or mechanical means that will depress, or when appropriate, eradicate populations in a manner that avoids excessive harm to non-target species using BMPs to control infestations and limit their spread based on an inventory of invasive insect distribution and response to outbreaks.

2.8.0.2 Develop, implement, monitor and evaluate pest control/management strategies to reduce the impacts of over-abundant wildlife species (native and/or native, invasive species) on native vegetation and the degradation of habitats supporting SGCN. Over-abundant wildlife species include but are not limited to mute swans, Canada geese, beaver and white-tailed deer.

2.8.0.3 Work with NJ Invasive Species Strike Team to identify areas with and eradicate aquatic invasive species such as the Asian Swamp Eel, Northern Snakehead, and the Chinese pond mussel. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.5 Implement biologically safe and appropriate control/management strategies, and where appropriate, eradication strategies to reduce the impacts and/or limit the distribution of invasive and/or non-native plant species within or near aquatic systems using methods that will provide the most protection to the aquatic and riparian ecological system, and minimize disturbance to the soil and wildlife. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.8.0.6 Implement long-term management of invasive and/or non-native plants to help maintain functioning ecological systems and biological diversity, and to enhance travel corridors. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.9 Living shorelines

2.9.2 Erosion control structures

2.9.2.1 Install breakwaters in the form of living shorelines to reduce the impact of wave erosion while preserving the natural character of the site.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.3 Restore and/or enhance habitats to benefit urban-associated SGCN.

2.10.0.4 Restore and/or enhance suitable travel corridors connecting conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.8 Protect significant natural and/or unique communities by implementing best management practices when conducting habitat restoration strategies.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.12 Create and/or maintain scrub-shrub habitats through revegetation efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.10.0.13 Restore and/or enhance impoundments to provide suitable foraging and nesting habitat for SGCN species inhabiting them (e.g., bitterns, rails, ducks, turtles and some invertebrates).

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.17 Maintain, enhance and/or restore SGCN-inhabited/used freshwater wetlands through restoring submerged aquatic vegetation.

2.10.0.21 Restore and/or enhance understory habitats that suppress invasive species and provide critical resources and enhance sheltering, foraging, and nesting cover for wildlife.

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.10.0.24 Use NJ's CHANJ mapping and guidance to establish vegetation and enhance or create corridors between fragmented habitats with similar vegetation, slope, soils, structure, etc. to ensure vegetative integrity is maintained to allow wildlife to safely disperse, and corridors are buffered with natural habitats to minimize disturbance to wildlife within the corridors.

2.10.0.25 Enhance SGCN fish habitats through aquatic and riparian vegetation restoration.

2.10.0.26 Reestablish/restore historically important submerged aquatic vegetation beds in Delaware Bay tributaries to benefit SGCN waterfowl, waterbirds, terrapins, sea turtles and finfish.

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through vegetation management.

2.11.0.6 Reclaim degraded rare species habitats by conducting vegetation management needed to restore habitat value for the documented/target SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.8 Maintain, enhance and/or restore biologically appropriate buffers for SGCN-inhabited/used freshwater wetlands through vegetation management.

2.11.0.13 Implement best management practices (BMPs), protective strategies, and guidelines for vegetation management to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.11.0.15 Implement vegetation management to benefit urban-associated SGCN.

2.11.0.16 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.11.0.18 Implement forest management/silvicultural strategies that promote the development of new old-growth forests and/or minimize the loss of old-growth forest stands with large trees and within large, contiguous tracts.

2.11.0.19 Implement forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN.

2.11.0.21 Minimize the degradation, alteration and/or changes in hydrology of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and subsequent disturbances to and behavioral changes of wildlife by maintaining or enhancing these areas and biologically appropriate buffers through habitat management and/or revegetation or restoration efforts.

2.11.0.22 Minimize habitat loss of high and low marsh habitats that provide nesting, migrating and wintering areas for SGCN birds and other marsh-dependent SGCN by maintaining or enhancing these areas through habitat management and/or revegetation or restoration efforts.

2.11.0.24 Conduct vegetation management adjacent to aquatic habitats following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.25 Conduct vegetation management along access roads following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.27 Conduct vegetation management for target shrub- or young forest-dependent SGCN following BMPs to minimize the risk of the establishment of invasive and non-native plants.

2.11.0.28 Conduct vegetation management in agricultural areas following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.29 Conduct vegetation management on transportation and service corridors (i.e., rights-of-way) following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.33 Increase structural habitat diversity by implementing long-term vegetation management to minimize the potential for the establishment of invasive and/or non-native plants that may outcompete native vegetation.

2.11.0.34 Increase structural habitat diversity by managing residential, commercial and recreational areas' landscapes for a variety of species. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.35 Increase structural habitat diversity by managing vegetation adjacent to aquatic habitats in a manner that provides a buffer from runoff and erosion and a microclimate to stabilize seasonal temperatures to benefit a variety of aquatic and semi-aquatic species.

2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.

2.11.0.37 Increase structural habitat diversity by minimizing the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats which benefits wildlife.

2.11.0.38 Increase structural habitat diversity in and around horse/livestock farms by managing vegetation for a variety of species, in particular, in and around farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

2.11.0.43 Manage forests to increase variation in age structure and composition using BMPs that promote and maintain functioning ecological forest-based systems and biological diversity.

2.11.0.44 Manage phragmites adjacent to coastal marshes of interest, in particular those that are within underdeveloped areas and are unprotected, through herbicide application and water management to improve resiliency of the marshes to sea level rise.

2.12 Water management

2.12.1 Ditch plugs

2.12.1.1 Implement best management practices (BMPs), protective strategies, and guidelines for ditch plugging to maintain and enhance healthy, resident and migratory SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.12.2 Diversion/headgate

2.12.2.1 Prevent or ameliorate near-term impacts of climate change throughout the State but in particular within the coastal and Delaware Bay areas by implementing habitat management strategies that will establish/improve habitat resilience, such as using diversions, that benefits wildlife inhabiting these areas.

2.12.3 Drainage

2.12.3.1 Remove drainage ditches to benefit urban-associated SGCN.

2.12.3.2 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) such as removing drainage ditches to restore natural stream flows and wetlands, that benefit wildlife inhabiting these areas.

2.12.3.3 Remove tile drains and drainage ditches to improve wetland hydrology and restore natural stream flows during appropriate times to avoid sensitive periods (e.g., nesting, denning, roosting) and minimizes harm to wildlife, particularly SGCN.

2.12.3.4 Expand the acreages and enhance the effective size of SGCN habitats by reclaiming/restoring adjacent, degraded habitats by removing tile drains and drainage ditches.

2.12.3.6 Protect significant natural and/or unique communities by and when removing tile drains and drainage ditches.

2.12.3.11 Implement best management practices (BMPs), protective strategies, and guidelines when removing tile drains and drainage ditches to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.12.5 Spring development

2.12.5.1 Implement a habitat improvement and restoration program to restore cold-water fish habitat, ecosystems and populations.

2.12.7 Waterfowl impoundment maintenance

2.12.7.1 Manage impoundments to benefit SGCN species inhabiting them (e.g., bitterns, rails, ducks, turtles and some invertebrates).

2.12.7.3 Implement best management practices (BMPs), protective strategies, and guidelines for impoundment management to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.12.7.4 Implement impoundment management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimizes harm to wildlife, particularly SGCN.

2.12.7.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through impoundment management.

2.12.7.6 Reclaim degraded rare species habitats through impoundment management needed to restore habitat value for the documented/target SGCN.

2.12.7.7 Protect significant natural and/or unique communities by implementing best management practices for impoundment management.

2.12.7.8 Repair impoundments damaged by salt hay farm/dike abandonment and conduct restoration of degraded sites for targeted SGCN species and their habitats.

2.12.7.14 Prevent or ameliorate near-term impacts of climate change throughout the State but in particular within the coastal and Delaware Bay areas by implementing habitat management strategies that will establish/improve habitat resilience, such as impoundment management, that benefits wildlife inhabiting these areas.

2.13 Wildlife damage management

2.13.0 Nuisance fish and wildlife damage

2.13.0.1 Investigate the impacts of mosquito control methods on predator SGCN (bats, insectivorous birds). Develop, implement and evaluate the effectiveness of mosquito control-BMPs designed to avoid depletion or contamination of SGCN's insect prey base and drinking sources with pyrethroids, organophosphates, or other chemicals.

2.13.0.4 Investigate the effects of mosquito control methods on freshwater aquatic and semi-aquatic SGCN including but not limited to, amphibian, fish, dragonfly, and damselfly populations.

2.13.0.5 Investigate the impacts of human-subsidized and/or naturally occurring predator species on SGCN to assess the need for integrated wildlife damage management techniques (e.g., predator exclosures, fish blockages, electric fence, culls) and/or policy changes on state land management that minimize the impacts of human-subsidized predators.

2.13.0.8 Implement and assess management strategies to control and reduce the impacts of detrimental species and diseases that pose threats to native wildlife or communities.

2.14 Wildlife disease management

2.14.0 Wildlife disease strategy development and investigation

2.14.0.1 Investigate diseases/pathogens impacting SGCN and/or their habitats.

2.14.0.2 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

2.14.0.3 Protect SGCN from exotic pathogen introduction or incident through implementation of a "rapid response plan"; DFW to give priority attention to these species in planning and/or implementing a response.

2.14.0.4 Conduct long-term monitoring of diseases in vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts.

2.14.0.5 Assess the impacts of diseases on the life cycles of wildlife.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.6 Conduct long-term studies on resident and migratory SGCN to determine if there are changes to the populations' demography (productivity, survival, dispersal) and/or to their critical and/or supporting habitats (i.e., diminishing in value, acreage or connectivity, etc.), in particular changes that would not maintain SGCN at viable levels for species populations. Update data and GIS maps; provide updated information to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.11 Develop, implement and evaluate the effectiveness of town plans that avoid impacts to SGCN species and their habitats.

3.0.0.12 Compile available life history information on urban-associated SGCN (e.g., predators, levels of nest/young depredation, breeding longevity and reproductive effort over time, preferred nesting/reproductive requirements, fidelity to breeding and wintering sites, comprehensive assessment of migration routes and destinations) for future development of management strategies to benefit such species.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.14 Identify areas with invasive, aquatic plants and animals and collect a detailed baseline assessment of the species' status and distribution. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort. Researchers and contractors performing Forest Stewardship Inventories and/or Plans on state lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.0.0.15 Conduct long-term monitoring of areas identified as having invasive, aquatic plants and animals to track the species' status/progress over time with or without the implementation of management strategies. Areas without management strategies should be assessed and prioritized for management/control. Areas where management strategies are being implemented should include an assessment of the management effort and identify/recommend and implement necessary changes to improve its success. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort.

3.0.0.19 Identify the presence and status (e.g., functioning, structure, slated for removal, etc.) of existing dams and culverts within and/or that may impact SGCN and their habitats, and create a database that includes a GIS component identifying the locations of such structures and their status. Share this information with appropriate organizations and/or agencies evaluating the benefits and risks of such structures on SGCN and their habitats.

3.0.0.20 Once baseline data identifying and describing the status of existing dams and culverts have been gathered, conduct evaluations at a variety of sites to determine whether the benefits of culvert and dam creation or removal outweigh the risks to SGCN species and their habitats, and if other variables/conditions specific to individual sites/locations result in a different outcome. Identify and target appropriate dams and culverts for removal and/or reconstruction to minimize harm to SGCN species and their habitats.

3.0.0.23 Identify (through wildlife and aquatic system surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and research water quality parameters for all [types of] aquatic systems for various SGCN populations.

3.0.0.26 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species including objectives and guidance pertaining to and the condition/status of critical and supporting habitats.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.2 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.0.3 Survey for and monitor populations of freshwater aquatic focal SGCN to assess the populations' demography, trends, condition, distribution, etc.

3.2.0.4 Conduct long-term monitoring of the impacts of contaminants to vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.2.0.5 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

3.2.0.7 Track (via a database that includes a GIS component) and research problematic species and diseases to determine their distribution, impacts on SGCN wildlife/wildlife communities, and develop potential control measures.

3.2.0.8 Implement and conduct long-term monitoring of control measures aimed at minimizing the impacts of problematic species and/or diseases to evaluate the effectiveness of such efforts and to identify and incorporate additional strategies as appropriate.

3.2.0.10 Evaluate the effectiveness of sanitation/decontamination protocols in minimizing the transference of wildlife diseases and invasive plant species.

3.2.0.15 Identify and compile information regarding critical time periods in which freshwater SGCN fish are vulnerable (e.g., spawning periods) using literature searches, review of available data, enlistment of species experts, etc.).

3.2.0.18 Conduct baseline surveys/inventories to better understand the distribution of fish and invertebrate (including freshwater mussels) populations.

3.2.0.21 Investigate the effects of mosquito control methods on freshwater aquatic and semi-aquatic SGCN including but not limited to, amphibian, fish, dragonfly, and damselfly populations.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.2 Age, size and sex structure

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.3 Baseline inventory

3.2.3.4 Establish population estimates and trends for all managed fish species.

3.2.3.6 Investigate the feasibility and potential for success of conducting genetic rescue through translocation and/or reintroduction of animals into suitable habitat that was historically occupied to increase genetic diversity and reconnect isolated populations. Methods of investigation should include, but are not limited to, thorough literature reviews, expert opinions, identifying potential pitfalls (e.g., species' fidelity to their range or critical areas), and an examination of historic and current SGCN population distribution and suitable habitat availability.

3.2.5 Genetics

3.2.5.1 Investigate the feasibility and potential for success of conducting genetic rescue through translocation and/or reintroduction of animals into suitable habitat that was historically occupied to increase genetic diversity and reconnect isolated populations. Methods of investigation should include, but are not limited to, thorough literature reviews, expert opinions, identifying potential pitfalls (e.g., species' fidelity to their range or critical areas), and an examination of historic and current SGCN population distribution and suitable habitat availability.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.6 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) that could, through revegetation and/or enhancement efforts, become suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN.

3.3.1.7 Map and prioritize existing and potential areas for early succession forest management. Share the results with state, county and municipal planners.

3.3.1.10 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and document fish SGCN habitats by plotting their distributions in GIS and submitting the data to the State for integration into the DEP's Biotics database.

3.3.1.11 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the quality and importance of areas with submerged aquatic vegetation to benefit waterfowl, finfish, and shellfish species.

3.3.1.16 Gather "best information" for spatial modeling and update/create a current model/depiction of anticipated habitat shifts from sea-level rise, flooding, etc.

3.3.1.18 Conduct an assessment using available data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels.

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.1.23 Identify areas (through surveys/studies, predictive modeling, review of available data, enlistment of habitat management and/or species experts, etc.) where the State can allow coastal marsh migration due to sea level rise, and target these areas for land acquisition and/or land management to accommodate this transition. Targeted areas should include underdeveloped areas adjacent to unprotected coastal marshes.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.1.26 Survey all historic locations and unsurveyed suitable habitats to identify populations of freshwater aquatic focal species.

3.3.1.27 Develop a matrix that lists every commercial and recreational fishery and aquaculture facility that operates in state waters and for each fishery listed, provide details regarding their fishing seasons, gear descriptions, locations and number of fishers. Add a GIS component to overlay species of concern and sensitive areas.

3.3.2 Monitoring

3.3.2.1 Evaluate the effectiveness of forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.4 Protect water quality and aquatic-dependent species by appropriately designating Category 1 waters and enforcing protective regulations. Seek appropriate classifications for stream segments based on Endangered and Threatened Status and/or the Index of Biotic Integrity (IBI) results that do not fulfill Category One requirements.

3.3.2.5 Conduct long-term monitoring of water quality of SGCN aquatic habitats (and aquatic systems feeding into those habitats) to evaluate protection and management efforts to reduce, if not eliminate, chemical contamination, siltation, eutrophication, and other forms of pollution/contamination of aquatic systems.

3.3.2.7 Conduct studies on land use practices such as ditching, impounding, dredging, open marsh water management, burning, and marsh restoration to evaluate the effectiveness and potential impacts on marsh-dependent SGCN.

3.3.2.14 Research and evaluate the effectiveness of water quality management practices on water-dependent and semi-dependent SGCN, particularly those practices associated with permitting or mitigation actions.

3.3.2.15 Investigate the effectiveness of management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.3.2.20 Once a system is developed for reporting and qualifying new locations of invasive species, develop, implement and monitor/evaluate invasive species removal strategies at identified locations. Priority should be given to those areas critical to SGCN and/or contain unique and/or rare plant communities supporting SGCN and/or other fish/wildlife species.

3.5 Techniques development

3.5.1 Artificial propagation studies

3.5.1.1 Conduct studies to evaluate the impacts (beneficial and detrimental) of aquaculture on migratory shorebirds, waterfowl, finfish, shellfish and other SGCN and their habitats, including evaluation of the relative effects of location and aquaculture techniques.

3.5.1.2 Develop and conduct studies that evaluate relative efficacy and feasibility of management actions designed to minimize adverse impacts and enhance beneficial effects.

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.7 Develop/improve forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

3.5.3.8 Develop best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5.3.9 Develop strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.12 Develop management actions to minimize the documented adverse impacts and reduce risks of potential adverse impacts of aquaculture on migratory shorebirds and other SGCN, including waterfowl, finfish, and shellfish and their habitats.

3.5.3.14 Develop aquaculture practices in the coastal areas that are compatible with the recovery of SGCN.

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.3.20 Develop guidance on various silviculture techniques for enhancing forests for forest-dependent SGCN.

3.5.3.22 Identify (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) and modify management strategies (e.g., timing restrictions for mowing, cooperative agreements with utility companies for maintenance of rights-of-ways), based on research, that maintain and enhance large existing areas of grassland in perpetuity.

3.5.3.23 Revise water quality management practices based on research on water-dependent and semi-dependent SGCN, particularly when associated with permitting or mitigation actions.

3.5.3.24 Based on research, modify management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.3.27 Conduct an assessment and develop a location list of available equipment for boom deployment during oil spills.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.2 Develop, implement, monitor and evaluate management strategies to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

3.5.4.4 Investigate the effects of mosquito control methods on freshwater aquatic and semi-aquatic SGCN including but not limited to, amphibian, fish, dragonfly, and damselfly populations.

3.5.4.5 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

3.5.4.6 Investigate the feasibility of mitigating for the impacts of contaminants to vulnerable wildlife, particularly SGCN. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.5.4.7 Investigate the feasibility and potential for success of conducting genetic rescue through translocation and/or reintroduction of animals into suitable habitat that was historically occupied to increase genetic diversity and reconnect isolated populations. Methods of investigation should include, but are not limited to, thorough literature reviews, expert opinions, identifying potential pitfalls (e.g., species' fidelity to their range or critical areas), and an examination of historic and current SGCN population distribution and suitable habitat availability.

3.5.4.12 Investigate and develop strategies to reduce "by-catch" of SGCN and other non-target species. Present findings and strategies to NJ DEP and conservation organizations for review and possible implementation. Develop a database documenting by-catch for use in management planning decisions.

3.5.4.14 Develop and implement agreements, and update existing agreements, with government agencies regarding the protection of critical SGCN habitats (e.g., significant breeding populations of beach nesting birds, colonial waterbird nesting areas, bat colonies, etc.).

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.17 Investigate new, non-invasive techniques for SGCN population evaluation through literature review, expert opinion, trial studies (if low risk), etc.

3.5.4.18 Investigate the effectiveness of survey techniques through selected "ground truthing" and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

3.5.4.21 Develop BMPs to address problematic species and diseases of unknown origin.

4 Education

4.1 Educator/Instructor training

4.1.0 Public education

4.1.0.1 Provide educational resources and training programs to private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

4.1.1 Aquatic resource education

4.1.1.1 Provide educational resources and training programs to teachers in aquatic resource education that includes information regarding climate change and sea-level rise for incorporation into the class curriculum and/or as the focus of school field trips.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.3 Secure and protect riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.4 Secure and protect fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.6 Secure and protect old-growth forest stands with large trees and/or stands that are approaching or being actively managed for old growth forests, in particular those within large, contiguous forest tracts, through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.7 Secure and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.8 Secure and protect scrub-shrub habitats for SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.3 Increase the protection of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through conservation area designations.

6.3.0.4 Promote the protection of fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through conservation area designations.

6.3.0.6 Promote the protection of old-growth forest stands with large trees and/or stands that are approaching or being actively managed for old growth forests, in particular those within large, contiguous forest tracts, through conservation area designations.

6.3.0.7 Promote the protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through conservation area designations.

6.3.0.8 Promote the protection of scrub-shrub habitats for SGCN through conservation area designations.

7 Law Enforcement

7.1 Law enforcement

7.1.4 Scale Unspecified

7.1.4.1 Improve enforcement of policies and/or regulations that promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

7.1.4.6 Recruit law enforcement to assist in the protection and enhancement of SGCN populations, in particular endangered species, through improved awareness of species through trainings, partnerships, and other methods. Information should include but is not limited to: 1) Issues concerning illegal collection of reptiles, 2) Persecution of rare snakes, 3) Illegal recreational activities on public lands (e.g., off-road vehicles) and their impact on wildlife, 4) Identification of sensitive areas, critical sites and/or "hot-spots" for collection.

7.1.4.9 Implement policies that improve and secure habitat connections between conserved SGCN habitats.

7.1.4.10 Implement policies that promotes expanding acreages and enhances the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.14 Implement policies that protect existing and developing old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

7.1.4.15 Implement policies that preserve and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

7.1.4.16 Implement policies that protect and restore riparian areas.

7.1.4.17 Improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

7.1.4.19 Implement policies that protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

7.1.4.20 Implement policies and/or regulations with the objective of reducing "by-catch" of SGCN and other non-target species.

7.1.4.26 Educate law enforcement personnel that there may be unauthorized research projects taking place and to encourage them to investigate any activities that appear to be harmful to wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.1 Coordinate research efforts among government agencies, non-government conservation partners and other stakeholders to investigate the impacts of aquaculture on migratory shorebirds, waterfowl, finfish, shellfish and other SGCN and their habitats, to determine relative effects of farming locations and aquaculture techniques, and to evaluate management actions to minimize such impacts.

8.1.0.2 Develop a team of personnel from government entities, conservation organizations and other stakeholders engaged in oil/gas spill response for marine and freshwater habitats to develop a feasible plan for oil spill response and/or to amend NJ's current oil spill response plan that clearly outlines each organizations responsibilities and an assessment and location list of available equipment for boom deployment during oil spills.

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.1.0.4 Engage government agencies, conservation partners and other stakeholders in constructive dialogues encouraging them to influence policy change and the creation of incentives through a habitat bill and/or municipal ordinances for backyard habitat.

8.1.0.10 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting sportsmen's organizations and fisheries, as well as public constituents, addressing the potential impacts of over-harvesting wildlife can have on the ecological system and to promote "sustainable harvest".

8.1.0.13 Engage DOD in a constructive dialogue regarding strategies to minimize disturbances to all SGCN (i.e., beyond their federal requirements) from forest management and other practices on their lands.

8.1.0.14 Engage DOD in a constructive dialogue regarding strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities.

8.1.0.15 Engage government agencies, conservation partners and other stakeholders in discussions encouraging and supporting the creation of laws and policies requiring vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

8.1.0.16 Engage local governments in discussions regarding the importance of them adopting/passing ordinances which require assessing and addressing secondary impacts (i.e., ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

8.1.0.17 Engage municipalities in constructive dialogue to identify and minimize destruction of areas prioritized for early succession forest management.

8.1.0.18 Engage NJDOT, NJ Transit Authority and other road management entities, wildlife conservation organizations/agencies (e.g., Division of Fish and Wildlife, New Jersey Conservation Foundation, Conserve Wildlife Foundation of NJ), and communities and citizens in discussions regarding the importance of and methods to enhance habitat connectivity, and work together to develop feasible strategies for ensuring that wildlife can disperse naturally and safely across roads and similar barriers to terrestrial and/or aquatic habitats.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.26 Coordinate across federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to woodland landowners to adopt or endorse consistent best management practices concerning controlled burns to maintain and/or improve forested habitat for wildlife.

8.1.0.27 NJ Division of Fish and Wildlife and their Game Council, and appropriate conservation partners and other stakeholders to review the freshwater fish code relative to SGCN or sensitive game species' populations and fecundity, and support amendments to the harvest quota or "bag limits" as needed.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.32 Work with NJ DEP's Water Management, other state agencies and watershed organizations to determine if mitigation is warranted at applicable power plants.

8.1.0.33 Engage government agencies, conservation partners and other land managers, communities, landowners, and commercial and industrial stakeholders in discussions regarding the importance of protecting and methods to protect priority wetlands beyond the levels afforded through regulation by maintaining and/or restoring optimal biological buffers around wetlands.

8.1.0.34 Work with the NJ Education Association and Department of Education to design curriculum and outdoor experimental learning opportunities, and provide training to teachers on implementation of these activities.

8.1.0.37 Enlist landowners and NJ citizens in the protection of and survey efforts for SGCN, in particular rare species, by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management and wildlife-related volunteer programs.

8.1.0.38 Engage partners, stakeholders and land managers in constructive dialogue promoting forest stewardship for SGCN that use core forests and forested corridors.

8.1.0.40 Encourage researchers, land managers, naturalists and enthusiasts to follow proper procedures for the coordination and/or permitting of research/management activities involving wildlife and sensitive habitats, and discourage activities that alter vegetation or wetlands, or cause harm or disturbance to wildlife.

8.1.0.44 Engage conservation partners, stakeholders, government agencies and other land stewards in constructive dialogues encouraging their inclusion of controlled burns in forest and other stewardship plans.

8.1.0.46 Form cooperative partnerships with dredging companies to facilitate habitat creation and enhancement within project areas, and to identify seasonal timing of activities that would minimize impacts to wildlife and their habitats.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.1.0.48 Form cooperative partnerships with transportation and shipment agencies and companies to facilitate habitat creation and enhancement away from and outside of project areas and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.1.0.49 Reduce the impacts of entrainment, impingement and thermal discharge at power plants by working with conservation partners, academia, etc. to ensure that best available technologies are utilized wherever possible.

8.2 Recruitment and retention activities

8.2.3 For wildlife watching

8.2.3.1 Develop and implement nature-focused tourism opportunities including wildlife viewing sites, interpretive signage highlighting unique ecosystems/habitats, and wildlife-related recreational opportunities that do not negatively impact SGCN or their habitats.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.1 Utilize WSFR grant funds, in combination with alternate funding sources as needed, to implement a scientific data-driven, extensive educational/outreach program targeting sportsmen's organizations and fisheries, as well as public constituents, addressing the potential impacts of over-harvesting wildlife can have on the ecological system and to promote "sustainable harvest".

8.3.0.2 Utilize WSFR grant funds, in combination with alternate funding sources as needed, to implement an extensive educational/outreach program consisting of displays, fliers, list-serve mailings, Facebook posts and speaking engagements with sportsmen's organizations and fisheries, as well as public constituents, addressing the unintended effects fishing gear and tackle can have on non-target species.

8.3.0.8 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate recreationists and encourage landowners to eliminate garbage in the vicinity of suitable wildlife habitat, in particular SGCN habitat. Information should include the detrimental impacts garbage may have on various wildlife species.

8.3.0.9 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners and land managers to include only native plants in landscaping and restoration projects. Provide information to assist them in detecting problematic establishment of invasive, non-indigenous plants.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.16 Develop an educational outreach program using a variety of media to ensure maximizing the distribution of information, in particular targeting sportsmen's organizations and fisheries, promoting "catch and release" and the impacts excessive harvests can have on wildlife populations.

8.3.0.17 Develop an educational outreach program using a variety of media to ensure maximizing the distribution of information, in particular targeting sportsmen's organizations and fisheries, promoting "sustainable harvest" using scientific data, and garner support from constituents through this outreach.

8.3.0.24 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

8.3.0.25 Develop educational outreach programs for landowners, nurseries and the general public regarding the negative impacts of invasive and non-native plants on our natural communities.

8.3.0.26 Develop educational outreach programs for private and public landowners and land managers regarding the importance of and how to manage core forests and forested corridors in a way that will be beneficial for SGCN, particularly endangered, threatened and special concern species.

8.3.0.27 Develop educational outreach programs for public and private landowners and land managers regarding the importance of structural habitat diversity, methods to increase diversity, and/or incentive programs available to increase habitat diversity.

8.3.0.28 Develop educational outreach programs for public and private landowners and land managers regarding the importance of managing grasslands for grassland-dependent species, methods of management, and/or incentive programs available.

8.3.0.29 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about the importance of maintaining a vegetative buffer along riparian and aquatic habitats to intercept storm water runoff and minimize soil erosion.

8.3.0.30 Develop educational outreach programs for private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.4 Develop a plan that directs the creation of new impoundments and/or the expansion of bogs for cranberry farming within or immediately adjacent to critical forested habitats in a manner that minimizes impacts on the natural hydrology of the watershed and subsequently, the natural wetlands in the area.

9.1.0.5 Develop a plan that directs the creation or expansion of energy or utility rights-of-way in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.6 Develop a plan that directs the creation or expansion of roads and railroads or the re-establishment of abandoned railroads within and adjacent to critical forested habitats in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.7 Develop a plan that directs the maintenance of or new channelization of forested streams and rivers in a manner that minimizes impacts of the aquatic ecological system and adjacent forest

9.1.0.8 Develop a plan that focuses on strategies for oil pipelines to avoid sensitive habitats that would be highly impacted by oil spills.

9.1.0.9 Develop a plan that focuses on strategies to minimize the creation of renewable energy farms (e.g., solar, wind) and related infrastructures within and their impacts on forested habitats and the wildlife community.

9.1.0.10 Develop a plan that focuses on strategies to minimize the impacts of mining on critical forested habitats.

9.1.0.11 Develop a plan that focuses on strategies to minimize the impacts of power plants on critical forested habitats and the wildlife community.

9.1.0.12 Develop a plan to avoid freshwater tidal management.

9.1.0.13 Develop a plan to minimize agriculture that would result in groundwater withdrawal in critical forested areas.

9.1.0.14 Develop a plan to minimize development that would result in groundwater withdrawal in critical forested areas.

9.1.0.15 Develop a plan to minimize fragmentation of terrestrial and aquatic habitats by roads.

9.1.0.16 Develop a plan to minimize new lawnscapes and preserve natural vegetation within and adjacent to critical forest areas.

9.1.0.17 Develop a plan to minimize nutrient and effluent loads from aquaculture practices.

9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

9.1.0.20 Develop a plan to minimize the impacts of existing agricultural properties adjacent to and the conversion of forest habitats (terrestrial and aquatic, within or adjacent to critical forests) to agriculture, grazing areas/livestock farms, and plantations.

9.1.0.21 Develop a plan to minimize the use of any-sized dam in critical forested areas.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.23 Develop a plan to mitigate the effects of transportation barriers by using CHANJ products.

9.1.0.24 Develop a plan to prevent livestock from entering water bodies in critical forested habitats.

9.1.0.25 Develop a plan to prevent the conversion of forested stream buffers to pastures in critical forested habitats.

9.1.0.26 Develop a plan to minimize any adverse impacts of aquaculture farming techniques and structures on freshwater and intertidal habitats.

9.1.0.27 Develop a plan to use wildlife-appropriate culverts in critical forested areas.

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.31 Develop wetland restoration plans that consider the life history and needs of wildlife occupying targeted habitats.

9.1.0.32 Incorporate aquatic habitat connectivity and water quality/effluent standards into local and state aquaculture plans and BMPs.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.2 Organizational strategic and CMS planning

9.2.1 Organizational strategic and operational planning

9.2.1.1 Identify and codify legal ORV access areas on state lands.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.5 Develop response plans to address disease outbreaks within wildlife populations, in particular SGCN.

9.3.1.6 Amend NJ's current oil spill response plan to 1) expand the geographic area addressed, 2) expand the targeted species impacted and in need of recovery, and 3) revise current and integrate new actions into the plan as needed.

9.3.1.7 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.10 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.14 Create species management plans that will promote the protection and where appropriate, the development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

9.3.1.15 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.1.16 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.1.19 Develop management strategies for freshwater SGCN fish and incorporate them into existing Freshwater Fisheries Management Plans.

9.3.1.20 Use compiled life history information on urban-associated SGCN regarding threats, breeding, fecundity, survival, habitat needs, wintering sites/roosts, migration routes and destinations, etc. to develop wildlife management strategies to benefit such species.

9.3.2 Listed species recovery planning

9.3.2.1 Develop proactive species recovery plans for all endangered and threatened species including guidance and objectives pertaining to critical and supporting habitat to meet and maintain recovery goals.

9.3.3 Habitat management planning

9.3.3.5 Develop a management plan using forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

9.3.3.6 Develop a management plan for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

9.3.3.7 Develop a management plan to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

9.3.3.8 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.3.9 Develop a response plan to outbreaks using BMPs to control infestations and limit their spread in a way that avoids excessive harm to non-target species.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.3.13 Develop a management plan that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas and prevents or ameliorates near-term impacts of climate change throughout the State, but in particular within the coastal and Delaware Bay areas.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.21 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.3.22 Create management plans to minimize and/or prevent wildlife road mortality that will incorporate wildlife passages in conjunction with barrier fencing and, where possible, seasonal closures. Aquatic-associated passages must avoid disturbance to the natural streambeds and riparian habitat, permit high volumes of water to flow freely, and provide adequate travel corridors for terrestrial wildlife, while maintaining stream flow for fish passage. Bridges that span rivers and streambeds and include floodplain habitat on either side of the span to provide travel corridors for terrestrial wildlife are preferred over culverts.

9.3.3.23 Create forest management plans that will promote the protection and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

9.3.3.24 Develop a plan to improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

9.3.3.28 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.3.29 Develop habitat management plans aimed at reducing or eliminating negative impacts of ORVs.

9.3.3.32 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3.34 Include controlled burn prescriptions in forest and stewardship plans to improve wildlife habitat.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

9.3.3.37 Develop management strategies for freshwater SGCN fish and incorporate them into existing Freshwater Fisheries Management Plans.

9.3.3.38 Use compiled life history information on urban-associated SGCN regarding threats, breeding, fecundity, survival, habitat needs, wintering sites/roosts, migration routes and destinations, etc. to develop habitat management strategies to benefit such species.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.3 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.9 Review strategies for creating or enhancing connectivity (e.g., installing appropriately-sized wildlife passages) between wetlands to allow wildlife to disperse naturally and safely.

11.1.1.10 Use CHANJ mapping in reviews of proposed energy, mining, transportation and utility service companies/agencies' projects to attempt to maintain habitat connectivity and reduce fragmentation, and identify potential impacts of the projects.

11.1.1.11 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed offshore energy projects relating to drilling, extraction and distribution of petroleum and gas products to reduce habitat destruction and minimize impacts on wildlife.

11.1.1.12 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed solar farm projects to reduce habitat fragmentation and minimize impacts on wildlife.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.2.2 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.2.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into the environmental review process to help establish policies and plans that minimize the impact of aquaculture on fish and wildlife.

11.1.2.4 Review strategies for creating or enhancing connectivity (e.g., installing appropriately-sized wildlife passages) between wetlands to allow wildlife to disperse naturally and safely.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.2 Provide technical support to public and private landowners and land managers for controlling invasive, native and non-native plant species in order to increase structural habitat diversity.

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.7 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on the importance of maintaining habitat connectivity, minimizing fragmentation, and the use of CHANJ products to help them target areas for such planning.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.11 Provide educational resources, training programs, and on-the-ground guidance to private and public landowners and land managers on the benefits of and for creating young forest and early succession habitat for SGCN.

11.2.0.12 Provide educational resources and technical support to public landowners and land managers for managing grasslands for grassland-dependent species.

11.2.0.13 Provide educational resources and technical support to public landowners, private landowners with sufficient acreage, and land managers to promote the protection and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

11.2.0.14 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters), and to enhance or restore biologically appropriate buffers.

11.2.0.15 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and landowners about the importance of retaining and in an effort to protect, create, enhance and/or restore vegetation along aquatic habitats.

11.2.0.16 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

11.2.0.18 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats.

11.2.0.19 Provide educational resources and technical support to public and private landowners and land managers to promote the protection and/or enhancement of scrub-shrub habitats for SGCN.

11.2.0.22 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

11.2.0.23 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to SGCN habitats to promote the protection and/or enhancement of those adjacent habitats to increase the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and that connect conserved SGCN habitats.

11.2.0.24 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers on how to manage vegetated roadside areas (e.g., mowing, brush-hogging, etc.) on a schedule that avoids peak activity periods for wildlife and therefore, minimizes harm.

11.2.0.25 Provide educational resources, training programs, and on-the-ground guidance to resource managers regarding the assessment of and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) related to residential and commercial development.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.1 Engage partners and stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.3 Provide educational resources, training programs, and on-the-ground guidance to DOD to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop and implement forest management and other practices that minimize disturbances to SGCN (i.e., beyond their federal requirements).

11.2.1.4 Provide educational resources, training programs, and on-the-ground guidance to dredging companies and resource managers on habitat creation and enhancement away from and outside of shipping lanes, and to identify seasonal timing of activities that would minimize impacts to wildlife and their habitats.

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

100 Law and Policy

100. Legislation

100.1.3 Sub-national Level

100.1.3.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.3.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.4 County and Local

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.3 Expand the acreages and enhance the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN through local ordinances.

100.1.4.4 Secure wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and biologically appropriate buffers through local ordinances.

100.1.4.5 Secure SGCN-inhabited/used freshwater wetlands and biologically appropriate buffers through local ordinances.

100.1.4.6 Secure fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through local ordinances.

100.1.4.9 Secure existing and developing old-growth forest stands with large trees, in particular those within large, contiguous forest tracts, through local ordinances.

100.1.4.10 Secure critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through local ordinances.

100.1.4.11 Secure riparian areas through local ordinances.

100.1.4.12 Secure scrub-shrub habitats for SGCN through local ordinances.

100.1.4.14 Adopt/pass local ordinances which require assessing and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.5.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.5.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into state/local policy to minimize the impact of aquaculture on fish and wildlife.

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100.1.5.5 Develop legislation to provide financial support for the New Jersey Invasive Species Strike Team.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.1 Develop (and/or improve) policies and/or regulations that will promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

100.3.0.5 Develop policies that will promote improved and secure habitat connections between conserved SGCN habitats.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.11 Develop policies that will ensure the protection and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

100.3.0.12 Develop policies that promote the preservation and protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.13 Develop policies that will promote protecting and restoring riparian areas.

100.3.0.14 Develop policies and/or regulations that increase the protective buffers of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) to biologically appropriate distances to benefit SGCN that rely upon these habitats and improve the function of the [associated] aquatic systems.

100.3.0.15 Develop policies that promote protecting and restoring scrub-shrub habitats to benefit shrub-dependent SGCN.

100.3.0.17 Develop and implement policies and/or regulations with the objective of reducing "by-catch" of SGCN and other non-target species.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.21 Develop policies that minimize wildlife road mortality through: 1) Requiring the integration of wildlife passages into all new and repaired roads, in particular those areas that will connect SGCN habitats, 2) Requiring current fish/wildlife passages be improved and maintained in perpetuity, 3) Supporting seasonal road closures, in particular for unimproved roads, 4) Supporting projects that work to improve connectivity of SGCN habitats such as land conservation through acquisition or other means.

100.3.0.22 Develop regulations that will protect urban-associated SGCN (restricting human access, buffering sensitive areas with postings, noise and/or light restrictions) in sensitive areas and/or during sensitive periods such as breeding, etc.

100.3.0.25 Amend the harvest quota or "bag limits" within the freshwater fish code relative to SGCN or sensitive game species' as needed.

100.3.0.26 Adopt regulations requiring the combined sewer overflow alternative analyses required by regulation address potential impacts to wildlife in watercourses or receiving water bodies.

100.3.0.31 Create or expand tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMPs.

100.3.0.32 Coordinate regulations across agencies to maximize availability of and enrollment in existing Forestry Stewardship Programs (e.g., "Woodland Stewards", Farm Bill, partners, etc.) to maintain and/or improve forest habitat.

100.3.0.33 Adopt additional timing restrictions, and any necessary permit conditions, into the Administrative Code for NJ DEP-permitted projects to minimize impacts on freshwater SGCN fish, in particular, within habitats during their vulnerable periods as identified through a thorough review of available information.

100.3.0.35 Incorporate Freshwater Fish Status Assessment (Delphi Technique) results pertaining to endangered and threatened species into regulations.

100.3.0.37 Develop a law and/or policy that requires NJ DEP to continue to address and correct the allowable combined sewer overflow inputs of solid waste into the marine environment to minimize harm to wildlife and their habitats.

100.3.0.38 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.3.0.39 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.3.0.40 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.

100.3.0.42 Fully adopt the former Storm water Management Rules' 300ft buffer requirements into the Flood Hazard Area Control Act Rules.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.48 Propose new State law or regulation mandating that a State-level "development impact fee" be assessed on all new development approved by municipalities (via the Municipal Land Use Law processes), and dedicate such monies to the development and implementation of regional Habitat Conservation Plans (or existing plans/programs serving the same regional function).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.53 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded rights-of-way corridors associated with energy transport/transmission.

100.3.0.54 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded surface mining areas.

100.3.0.55 Develop regulations to address potentially adverse effects of aquaculture on SGCN species and their habitats.

100.3.0.57 Develop regulations that when implemented will improve and secure habitat connections between conserved SGCN habitats.

100.3.0.58 Develop regulations that when implemented will promote the expansion of acreages and enhancement of the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.62 Develop regulations that when implemented will protect existing old-growth forest stands with large trees and/or stands that are being actively managed for old growth forests, in particular those within large, contiguous forest tracts.

100.3.0.63 Develop regulations that when implemented will preserve and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.64 Develop regulations that when implemented will protect and restore riparian areas.

100.3.0.65 Develop regulations that when implemented will protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

100.3.0.66 Develop regulations with the objective of reducing "by-catch" of SGCN and other non-target species.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.2 Create a policy that requires the NJ DEP to incorporate scientific information regarding climate change and sea level rise (e.g., predictions, habitat management/acquisition efforts to enhance resilience to inundation) on their websites and to work with other government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

100.4.0.3 Develop policies for mandatory buffer strips on preserved farmlands and state-owned agricultural lands.

100.4.0.4 Create a policy that requires the use of wildlife habitat and corridor mapping products for both regulatory use when conducting project reviews and planning/siting new or expanded rights-of-way projects.

100.4.0.8 Develop a white paper addressing the impacts that existing, new or expanded rights-of-way have upon wildlife, wildlife habitats and habitat connectivity.

100.4.0.9 Develop and implement policies to minimize the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats in order to benefit wildlife.

100.4.0.12 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.4.0.13 Develop policies for different circumstances (e.g., roadsides and medians, riparian, aquatic and terrestrial habitats) that outline appropriate habitat/vegetation management strategies and schedules to minimize risks to and benefit wildlife.

100.4.0.16 Develop policies to implement habitat management strategies that will increase the structural diversity surrounding areas used for energy, mining, and transportation and service corridors which include but are not limited to the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-

100.4.0.17 Develop policies to implement habitat management strategies, including prescribed burns, that will increase the structural diversity on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies to control and reduce the impacts of invasive, non-native species in order to increase structural habitat diversity.

100.4.0.18 Develop policies to minimize the extent of infrastructure associated with energy and service corridors or areas (e.g., wind and solar farms, pipelines, utility lines) and that require the implementation of habitat management strategies that will increase the structural diversity in the area including (e.g., the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides).

100.4.0.19 Develop regulations that will minimize the creation of new barriers, remove or replace current barriers with appropriately-sized systems to accommodate wildlife dispersal, and to minimize road widening and traffic volume increases within critical wildlife habitat areas.

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.21 Ensure that Section 303(d) of the Clean Water Act and applicable State statutory/regulatory requirements for surface water pollutant budgets are being met by monitoring and enforcing regulatory Total Maximum Daily Load (TMDL) targets established within regional Water Quality Management Plans.

100.4.0.22 Work with NJ DEP's Division of Land Use Regulation to ensure protection of listed species and their habitats during stream cleaning events.

100.4.0.23 Adopt additional timing restrictions, and any necessary permit conditions, into the Administrative Code for NJ DEP-permitted projects to minimize impacts on freshwater SGCN fish, in particular, within habitats during their vulnerable periods as identified through a thorough review of available information.

100.4.0.24 Develop policies to provide financial support for the New Jersey Invasive Species Strike Team.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Macroinvertebrates

Arogos Skipper

Focal species that comprise this Conservation Target:

Arogos Skipper

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:
- 1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.1.1.2 Loss, alteration and/or degradation of habitat.
- 1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:
- 1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.2.1.2 Loss, alteration and/or degradation of habitat.
- 1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:
- 1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.3.1.2 Loss, alteration and/or degradation of habitat.
- 1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture (Avg. Score: 3.00)

NJ Specific Threats:
- 2.1.1.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.
- 2.1.1.5 Lack of competitive market prices to maintain native grasslands causes conversion to other crops that have more monetary value but less value as wildlife habitat.

2.1.2 Small-holder Farming (Avg. Score: 1.00)

NJ Specific Threats:
- 2.1.2.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.
- 2.1.2.2 Fragments terrestrial and aquatic habitats.
- 2.1.2.4 Agricultural practices (e.g., mechanized, row-crop agriculture) can cause direct mortality to wildlife when harvesting takes places.
- 2.1.2.5 Lack of competitive market prices to maintain native grasslands causes conversion to other crops that have more monetary value but less value as wildlife habitat.

2.1.3 Agro-industry (Avg. Score: 3.00)

NJ Specific Threats:
- 2.1.3.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.
- 2.1.3.2 Fragments terrestrial and aquatic habitats.
- 2.1.3.5 Loss of ecotones by implementing clean farming (edge-to-edge) practices degrades habitat for early successional wildlife.
- 2.1.3.6 Lack of competitive market prices to maintain native grasslands causes conversion to other crops that have more monetary value but less value as wildlife habitat.

2.2 Wood and Pulp Plantations

2.2.1 Small Holder (Avg. Score: 1.00)

NJ Specific Threats:
- 2.2.1.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.2.2 Agro-industry Plantations (Avg. Score: 1.00)

NJ Specific Threats:
- 2.2.2.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.3 Livestock Farming and Ranching

2.3.2 Small-holder Grazing (Avg. Score: 1.00)

NJ Specific Threats:
- 2.3.2.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.
- 2.3.2.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.
- 2.3.2.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.
- 2.3.2.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

2.3.3 Agro-industry Grazing (Avg. Score: 3.00)

NJ Specific Threats:
- 2.3.3.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.
- 2.3.3.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.
- 2.3.3.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.
- 2.3.3.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

3 Energy Production and Mining

3.2 Mining and Quarrying

3.2.2 Surface Mining - Rock Quarry (and sand quarries) (Avg. Score: 1.00)

NJ Specific Threats:
- 3.2.2.1 Fragments terrestrial and aquatic habitats.
- 3.2.2.2 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

3.3 Renewable Energy

3.3.2 Solar Power (Avg. Score: 1.00)

NJ Specific Threats: 3.3.2.2 Loss, alteration and/or degradation of habitat.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads (Avg. Score: 1.00)

NJ Specific Threats: 4.2.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species, inhibiting dispersal of non-volant animals, reducing gene flow, and creating barriers to fish when service line-associated roads cross streams (e.g., bridges, culverts, fords, etc.).

4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

4.2.2 Management of rights-of-way or communication tower facilities and/or their associated access roads (Avg. Score: 3.00)

NJ Specific Threats: 4.2.2.1 Improper or poorly scheduled vegetation management can cause direct mortality to and may reduce productivity of wildlife.

5 Biological Resource Use

5.1 Hunting and Collecting Terrestrial Animals

5.1.1 Intentional Use (Avg. Score: 1.00)

NJ Specific Threats: 5.1.1.1 Illegal collection of wildlife can have detrimental impacts on populations.

5.2 Gathering Terrestrial Plants

5.2.3 Control (Avg. Score: 2.00)

NJ Specific Threats: 5.2.3.1 Alteration or control of undesirable plants or plant communities can destroy important food and nectar plants for native insects and animals.

5.3 Logging and Wood Harvesting

5.3.1 Intentional Use (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.1.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.1.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.1.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.1.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.1.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.1.6 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices in Atlantic White Cedar stands may destroy a unique wildlife wetland habitat that is difficult, and takes time, to restore.

5.3.2 Intentional Use (large scale) (Avg. Score: 1.00)

NJ Specific Threats:

5.3.2.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.2.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.2.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.2.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.2.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.2.6 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices in Atlantic White Cedar stands may destroy a unique wildlife wetland habitat that is difficult, and takes time, to restore.

5.3.3 Unintentional effects (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats:

5.3.3.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4 Unintentional effects (large scale) (Avg. Score: 1.00)

NJ Specific Threats:

5.3.4.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4.5 Lack of appropriate, sustainable forest management can lead to a decrease in forest habitat diversity, degraded habitat for many forest species, the loss of habitat for early-successional species, and/or the loss of unique habitats for species that need canopy breaks and multi-aged tree composition to fulfill various life history requirements.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized) (Avg. Score: 3.00)

NJ Specific Threats:

6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.

6.1.1.3 Increased risk of harassment that results in a change in wildlife behavior and/or direct mortality from vehicle strikes.

6.1.1.6 Off-road vehicles can be a mechanism of transference of wildlife diseases and invasive plant species if gear and apparel are not properly sanitized between sites.

7 Natural Systems Modifications

7.1 Fire and Fire Suppression

7.1.1 Increase in Fire Frequency/Intensity (Avg. Score: 3.00)

NJ Specific Threats:

7.1.1.1 Increase in frequency and intensity of wild fires as a result of droughts and heat waves drying out vegetation and litter.

7.1.1.2 Increase in frequency of wild fires as a result of illegal activities.

7.1.1.3 Unnatural fire regimes occurring as a result of military exercises.

7.1.1.4 Lack of diversity in age structure and composition of vegetation due to expansive, frequent fires.

7.1.2 Suppression of Fire Frequency/Intensity (Avg. Score: 3.00)

NJ Specific Threats: 7.1.2.1 Shift in vegetative communities as a result of suppression of natural fires.

7.3 Other Ecosystem Modifications

7.3.2 Inappropriate timing of mowing (Avg. Score: 3.00)

NJ Specific Threats: 7.3.2.1 Increased risk of direct mortality and/or reduced productivity of wildlife, as well as reduced use by migrating species.

7.3.4 Lack of natural disturbance patterns or ecosystem functions due to species loss (Avg. Score: 3.00)

NJ Specific Threats: 7.3.4.5 The lack of forest disturbance minimizes the diversity of herbaceous vegetation and other shrubs and trees that need a lot of sunlight to grow.

7.3.5 Poor habitat management (Avg. Score: 3.00)

NJ Specific Threats: 7.3.5.1 Improper or poorly scheduled maintenance of man-made corridors (e.g., roadsides and medians) can cause direct mortality to and may reduce productivity of wildlife.

7.3.5.3 Vegetation clearing removes terrestrial and riparian corridors for animal movement, shelter, and resting areas.

7.3.5.5 Habitat management that alters or removes vegetation without implementing long-term management increases the risk of invasive and exotic plants establishing themselves, outcompeting native vegetation.

7.3.5.6 Habitat management, including that which occurs on public and private lands, that does not consider timing and species' behaviors can result in the direct mortality and/or alteration or loss of habitat.

7.3.5.7 Improperly planned habitat management and/or mitigation efforts along roadsides and within the medians can attract wildlife and increase the risk of vehicle strikes.

7.3.5.12 Lack of diversity in age structure and composition of vegetation due to lack of natural disturbances and/or vegetation management.

7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

7.3.5.18 Lack of funding or competitive market prices to maintain native grasslands for grassland-dependent species causes conversion of fallow or hay fields to other crops or shrublands.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.1.1.1 Displace or outcompete native species for resources.

8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.

8.1.1.3 Invasive, non-native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

8.1.1.4 Invasive, non-native animals increase the risk of predation on native animals and/or herbivory on native vegetation.

8.1.1.5 Invasive, non-native animals and plants increase the risk of introduction and transference of diseases

8.1.1.6 Invasive, non-native plants may create physical barriers for some species.

8.1.4 Invasive non-native terrestrial/wetland animals (Avg. Score: 2.00)

NJ Specific Threats: 8.1.4.1 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.6 Invasive non-native fungal/bacterial diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.1.6.1 The introduction of non-native fungal and bacterial diseases threatens native populations and ecosystems.

8.2 Problematic Native Species/Diseases

8.2.2 Named Species (Avg. Score: 1.00)

NJ Specific Threats: 8.2.2.2 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.4 Problematic Species/Diseases of Unknown Origin

8.4.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.4.1.1 Non-native or poorly understood diseases and parasites could potentially impact native animals.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.3 Agricultural and Forestry Effluents

9.3.2 Soil Erosion and Sedimentation (Avg. Score: 1.00)

NJ Specific Threats: 9.3.2.2 Soil erosion and sedimentation limit the re-establishment of plants needed by terrestrial wildlife as cover and a food base.

9.3.3 Herbicides and Pesticides (Avg. Score: 3.00)

NJ Specific Threats: 9.3.3.1 Pesticides degrade terrestrial and aquatic habitats, especially streams, ponds and wetlands. Aquatic wildlife are particularly sensitive to these contaminants, which can cause developmental and behavioral abnormalities and reproductive failure. Some contaminants may bioaccumulate in predatory fish and birds and disrupt reproduction.

9.3.3.3 Use of pesticides can directly harm non-target species through direct contact and/or by reducing and/or contaminating their food supply.

9.3.3.4 Use of herbicides can destroy beneficial food and nectar plants for insects.

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture (Avg. Score: 3.00)

NJ Specific Threats: 9.3.5.1 Use of pesticides, insecticides, and/or herbicides can directly harm non-target species, such as amphibians and beneficial invertebrates through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5.2 Use of herbicides can destroy beneficial food and nectar plants for insects.

9.3.5.4 Improper use of current insecticides, such as those containing esfenvalerate, prallethrin, or piperonyl butoxide, or past use of pesticides containing chlordane still present in the soils, are toxic to various wildlife species, and can cause injury, mortality, or other effects that impair population viability.

9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.5 Air-Bourne Pollutants

9.5.4 Other (Avg. Score: 1.00)

NJ Specific Threats: 9.5.4.1 Dust and/or airborne sedimentation from construction sites, agricultural operations or related earth disturbances can introduce mineral or organic sediments into adjacent wildlife habitats, degrading their quality and suitability for wildlife short-term and/or long-term.

9.5.6 Herbicides and Pesticides (Avg. Score: 3.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 3.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.6 Phenology Shifting or Alteration

11.6.1 Phenology shifts related to pollination ecology (Avg. Score: 1.00)

NJ Specific Threats: 11.6.1.1 Alters inter-specific relationships of wildlife and vegetation, ultimately leading to detrimental impacts on the ecological system.

11.6.3 Phenology shifts related to species redistribution (Avg. Score: 1.00)

NJ Specific Threats: 11.6.3.1 Shifts in timing of species migration, breeding and hibernation, and available food resources, as a result of wildlife range shifts driven by climate change.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 3.00)

NJ Specific Threats: 12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.2 Lack of up-to-date existing information (Avg. Score: 3.00)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.3 Need to answer research question (Avg. Score: 3.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.4 Need to develop new technique (Avg. Score: 3.00)

NJ Specific Threats: 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 1.00)

NJ Specific Threats: 12.3.0.1 Regulatory habitat protections within state land use regulations are spatially limited to specific geographic areas (e.g., Pinelands, Coastal Area) or geographic features (e.g., wetlands, streams) and so fail to protect critical habitats that exist outside of these regulated areas.

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.9 Prescribed burns implemented by the NJ Forest Fire Service are constrained by State air quality regulations to a timeframe where seasonal weather conditions are less than ideal for effective burning. As a result, the Forest Fire Service is limited in the number of overall prescribed burns it can implement to restore habitat for wildlife.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 1.00)

NJ Specific Threats:

12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.

12.4.0.5 Bureau of Forest Fire Management policy has traditionally implemented prescribed burns on State lands for the sole purpose of public safety (i.e., addressing hazard fuel reduction), missing opportunities to burn in a manner that would additionally manage habitat for ecological diversity.

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 3.00)

NJ Specific Threats:

14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 3.00)

NJ Specific Threats:

14.2.1.1 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various forest management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 1.00)

NJ Specific Threats:

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.5 Secure and promote the protection/restoration of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through incentive programs.

1.2.1.6 Secure and promote the protection/restoration of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.9 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing Forestry Stewardship Programs.

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.12 Create incentives (non-monetary and/or monetary) for land developers to redevelop abandoned areas (e.g., shopping centers, office complexes) to minimize the loss of natural habitats and reduce the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.14 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of herbicides and pesticides, and implementing more ecologically safe strategies when using such products.

1.2.1.15 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of rodenticides, and implementing more ecologically safe strategies when using such products.

1.2.1.16 Create incentives (non-monetary and/or monetary) within State regulations (mitigations requirements or credit, BMP satisfaction, etc.) to promote the use of retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.17 Develop a public-relations oriented certification program for private retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.18 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and land managers to control and reduce the impacts of invasive, native and non-native species in order to increase structural habitat diversity.

1.2.1.19 Create incentives for federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to farmers, woodland landowners, and private landowners to adopt and/or endorse consistent BMPs concerning controlled burns to maintain and/or improve wildlife habitat.

1.2.1.20 Coordinate across government agencies and non-government organizations to create or expand upon tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMP's.

1.2.1.21 Create and/or support market-based programs that subsidize or create branding for products derived sustainably from managed wildlife habitats.

1.2.1.22 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to horse/livestock farm owners and managers to increase structural habitat diversity in and around the farms by managing vegetation for a variety of species, in particular, farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

1.2.1.23 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to provide cost shares and/or plan approvals for management based on management approaches and prescriptions.

1.2.1.24 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners, with habitat of suitable patch size to support breeding grassland-dependent species, to alter the timing of vegetation management to benefit grassland and pollinator species.

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

1.2.1.28 Create incentives to implement dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

2 Direct Management of Natural Resources

2.3 Fire management

2.3.2 Fuel reduction

2.3.2.1 Prevent wildfires by reducing natural fuel (e.g., leaf litter).

2.3.3 Prescribed burning

2.3.3.1 Evaluate different management techniques of prescribed burns that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

2.3.3.2 Conduct prescribed burning in Northern New Jersey forests to maintain and regenerate a mosaic of upland forest habitats.

2.3.3.3 Conduct prescribed burning to improve wildlife habitat.

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.1 Control invasive insect infestations by implementing BMP strategies through biological, chemical and/or mechanical means that will depress, or when appropriate, eradicate populations in a manner that avoids excessive harm to non-target species using BMPs to control infestations and limit their spread based on an inventory of invasive insect distribution and response to outbreaks.

2.8.0.2 Develop, implement, monitor and evaluate pest control/management strategies to reduce the impacts of over-abundant wildlife species (native and/or native, invasive species) on native vegetation and the degradation of habitats supporting SGCN. Over-abundant wildlife species include but are not limited to mute swans, Canada geese, beaver and white-tailed deer.

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.5 Implement biologically safe and appropriate control/management strategies, and where appropriate, eradication strategies to reduce the impacts and/or limit the distribution of invasive and/or non-native plant species within or near aquatic systems using methods that will provide the most protection to the aquatic and riparian ecological system, and minimize disturbance to the soil and wildlife. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.8.0.6 Implement long-term management of invasive and/or non-native plants to help maintain functioning ecological systems and biological diversity, and to enhance travel corridors. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.2 Improve the availability of prey/food resources through terrestrial and aquatic plantings and habitat restoration for SGCN populations, in particular for those populations thought to be limited due wholly or in part to a lack of (or contaminated) food resources, and for migratory species (birds, bats, invertebrates).

2.10.0.3 Restore and/or enhance habitats to benefit urban-associated SGCN.

2.10.0.4 Restore and/or enhance suitable travel corridors connecting conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.8 Protect significant natural and/or unique communities by implementing best management practices when conducting habitat restoration strategies.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.10 Minimize the loss of important habitats (e.g., coastal scrub-shrub and grassy habitats, high and low marsh habitats, etc.) that provide nesting, migrating, and wintering areas for SGCN birds and other coastal and marsh-dependent species through habitat restoration efforts.

2.10.0.11 Restore and/or enhance critical migratory terrestrial and aquatic habitats (e.g., beach, grasslands, forest, scrub-shrub, etc.) for songbirds, raptors, shorebirds, waterfowl, bats and invertebrates through habitat restoration efforts and expand habitat restoration to adjacent private lands to increase the effective size of the habitat.

2.10.0.12 Create and/or maintain scrub-shrub habitats through revegetation efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.15 Restore and/or enhance terrestrial and aquatic habitats proximate to but not adjacent to roads and other transportation corridors for terrestrial-bound SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.10.0.21 Restore and/or enhance understory habitats that suppress invasive species and provide critical resources and enhance sheltering, foraging, and nesting cover for wildlife.

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.11.0.3 Create suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats through vegetation management.

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through vegetation management.

2.11.0.6 Reclaim degraded rare species habitats by conducting vegetation management needed to restore habitat value for the documented/target SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.23 Implement appropriate habitat management actions in areas where natural disturbances, such as wildfire, have been precluded.

2.11.0.24 Conduct vegetation management adjacent to aquatic habitats following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.25 Conduct vegetation management along access roads following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.26 Conduct vegetation management along roadsides and medians, avoiding peak activity periods for wildlife, that enhances wildlife dispersal naturally and safely across roads and similar barriers to/between terrestrial and/or aquatic habitats.

2.11.0.27 Conduct vegetation management for target shrub- or young forest-dependent SGCN following BMPs to minimize the risk of the establishment of invasive and non-native plants.

2.11.0.28 Conduct vegetation management in agricultural areas following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.29 Conduct vegetation management on transportation and service corridors (i.e., rights-of-way) following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.30 Identify and prioritize areas where various management tools (such as increasing salinity through the management of water levels or chemical applications) may be effective in reducing phragmites within and restoring marsh habitat.

2.11.0.31 In areas where vegetative communities are shifting due to fire suppression and controlled burns are not feasible, manage vegetation to improve wildlife habitat.

2.11.0.32 Increase structural habitat diversity around and when feasible, within agricultural landscapes by managing vegetation for a variety of species, in particular, those farms that have removed scrub-shrub habitat and/or fragmented forests, and by implementing ecologically best practices (e.g., no-till farming, maintaining hedgerows, buffer set-asides, etc.).

2.11.0.33 Increase structural habitat diversity by implementing long-term vegetation management to minimize the potential for the establishment of invasive and/or non-native plants that may outcompete native vegetation.

2.11.0.34 Increase structural habitat diversity by managing residential, commercial and recreational areas' landscapes for a variety of species. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.

2.11.0.38 Increase structural habitat diversity in and around horse/livestock farms by managing vegetation for a variety of species, in particular, in and around farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

2.11.0.39 Increase structural habitat diversity in and around solar farms by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.40 Increase structural habitat diversity surrounding areas used for energy, mining, and transportation and service corridors by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides, and avoid managing habitat during the breeding seasons for ground-nesting birds, reptiles, amphibians and small mammals.

2.11.0.41 Increase structural habitat diversity through the implementation of a variety of vegetation management practices such a prescribed burns (either increasing or decreasing their frequency depending on the site and objective), plantings, etc. that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.42 Increase structural habitat diversity within wind farms for terrestrial bound and low-flying species and around wind farms for other wildlife by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.43 Manage forests to increase variation in age structure and composition using BMPs that promote and maintain functioning ecological forest-based systems and biological diversity.

2.11.0.45 Regularly and/or rotationally create young forest habitat in targeted areas to maintain and regenerate a mosaic of upland forest habitats that will benefit shrub- and young forest-dependent species.

2.14 Wildlife disease management

2.14.0 Wildlife disease strategy development and investigation

2.14.0.1 Investigate diseases/pathogens impacting SGCN and/or their habitats.

2.14.0.2 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

2.14.0.3 Protect SGCN from exotic pathogen introduction or incident through implementation of a "rapid response plan"; DFW to give priority attention to these species in planning and/or implementing a response.

2.14.0.4 Conduct long-term monitoring of diseases in vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts.

2.14.0.5 Assess the impacts of diseases on the life cycles of wildlife.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.6 Conduct long-term studies on resident and migratory SGCN to determine if there are changes to the populations' demography (productivity, survival, dispersal) and/or to their critical and/or supporting habitats (i.e., diminishing in value, acreage or connectivity, etc.), in particular changes that would not maintain SGCN at viable levels for species populations. Update data and GIS maps; provide updated information to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.14 Identify areas with invasive, aquatic plants and animals and collect a detailed baseline assessment of the species' status and distribution. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort. Researchers and contractors performing Forest Stewardship Inventories and/or Plans on state lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.0.0.15 Conduct long-term monitoring of areas identified as having invasive, aquatic plants and animals to track the species' status/progress over time with or without the implementation of management strategies. Areas without management strategies should be assessed and prioritized for management/control. Areas where management strategies are being implemented should include an assessment of the management effort and identify/recommend and implement necessary changes to improve its success. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort.

3.0.0.26 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species including objectives and guidance pertaining to and the condition/status of critical and supporting habitats.

3.0.0.27 Evaluate the effectiveness of strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals through research and monitoring. Develop and provide NJ DEP and other appropriate governing agencies/commissions a summary of findings and recommendations to improve such efforts.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.7 Track (via a database that includes a GIS component) and research problematic species and diseases to determine their distribution, impacts on SGCN wildlife/wildlife communities, and develop potential control measures.

3.2.0.8 Implement and conduct long-term monitoring of control measures aimed at minimizing the impacts of problematic species and/or diseases to evaluate the effectiveness of such efforts and to identify and incorporate additional strategies as appropriate.

3.2.0.18 Conduct baseline surveys/inventories to better understand the distribution of fish and invertebrate (including freshwater mussels) populations.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.2 Age, size and sex structure

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.3 Baseline inventory

3.2.3.9 Investigate hazardous environmental issues that may impact grassland invertebrates.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.6 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) that could, through revegetation and/or enhancement efforts, become suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN.

3.3.1.7 Map and prioritize existing and potential areas for early succession forest management. Share the results with state, county and municipal planners.

3.3.1.8 Assess the availability and suitability of forest habitats for SGCN species (particularly reptiles and amphibians, birds, pollinators, and tiger beetles) in southern forests since Superstorm Sandy.

3.3.1.9 Inventory forests throughout northern New Jersey to develop a baseline characterization of the structure and composition of habitats and identify deficient forest habitat types.

3.3.1.10 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and document fish SGCN habitats by plotting their distributions in GIS and submitting the data to the State for integration into the DEP's Biotics database.

3.3.1.16 Gather "best information" for spatial modeling and update/create a current model/depiction of anticipated habitat shifts from sea-level rise, flooding, etc.

3.3.1.17 Identify and map undeveloped roads and trails in all conserved forests, and create a database of locations. Integrate information regarding potentially sensitive areas.

3.3.1.18 Conduct an assessment using available data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels.

3.3.1.19 Identify and codify legal ORV access areas on state (and if appropriate, other conserved) lands. Provide GIS mapping to the landowner for potential use in directing such recreational activities.

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.2 Monitoring

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.8 Evaluate the effectiveness of current prescribed burning practices on Pinelands dependent species.

3.3.2.10 Evaluate the efficacy and success of different management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.3.2.11 Evaluate and compare the effectiveness of delayed mowing of warm season grass fields versus cool season hay fields to benefit grassland-dependent species.

3.3.2.12 Evaluate and compare the effectiveness of different management techniques (e.g., prescribed burning, mowing, brush-hogging, etc.) for maintaining suitable habitat for grassland-dependent species and species dependent upon early successional habitats.

3.3.2.13 Evaluate the effectiveness of management strategies (e.g., timing restrictions for mowing, cooperative agreements with utility companies for maintenance of rights-of-ways) that maintain and enhance large existing areas of grassland in perpetuity. Focus on habitat patches that can be managed to enhance the total size of suitable grassland habitat and create interspersed early-successional habitat.

3.3.2.15 Investigate the effectiveness of management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.3.2.20 Once a system is developed for reporting and qualifying new locations of invasive species, develop, implement and monitor/evaluate invasive species removal strategies at identified locations. Priority should be given to those areas critical to SGCN and/or contain unique and/or rare plant communities supporting SGCN and/or other fish/wildlife species.

3.3.2.24 Conduct regular inventories of forests throughout northern New Jersey to characterize the changing structure and composition of habitats and monitor forest conditions.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.3 Develop/improve management techniques that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.9 Develop strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.3.16 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.3.19 Work with foresters to develop prescribed burning practices for Pinelands dependent species that increase or maintain habitat quality for these species in the Pinelands.

3.5.3.21 Develop management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.22 Identify (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) and modify management strategies (e.g., timing restrictions for mowing, cooperative agreements with utility companies for maintenance of rights-of-ways), based on research, that maintain and enhance large existing areas of grassland in perpetuity.

3.5.3.24 Based on research, modify management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.3.29 Explore the use of alternative vegetation (i.e., commodity crops) to address agriculture concerns.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.5 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

3.5.4.6 Investigate the feasibility of mitigating for the impacts of contaminants to vulnerable wildlife, particularly SGCN. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.5.4.14 Develop and implement agreements, and update existing agreements, with government agencies regarding the protection of critical SGCN habitats (e.g., significant breeding populations of beach nesting birds, colonial waterbird nesting areas, bat colonies, etc.).

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.18 Investigate the effectiveness of survey techniques through selected “ground truthing” and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

3.5.4.21 Develop BMPs to address problematic species and diseases of unknown origin.

4 Education

4.1 Educator/Instructor training

4.1.0 Public education

4.1.0.1 Provide educational resources and training programs to private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

5 Facilities and Areas

5.15 Wildlife Management Areas

5.15.6 Roads

5.15.6.1 Clearly post areas/roads where vehicle access is permitted.

5.15.6.2 Clearly post areas/trails where vehicle access is not permitted.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.7 Secure and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.8 Secure and protect scrub-shrub habitats for SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.8 Promote the protection of scrub-shrub habitats for SGCN through conservation area designations.

6.4 Private lands agreements

6.4.0 Private land agreement strategies

6.4.0.1 Enter into private lands agreements to expand control burns on private lands, in particular those adjacent to conserved lands to improve SGCN habitats.

7 Law Enforcement

7.1 Law enforcement

7.1.3 Sub-national Level

7.1.3.2 Increase the number of law enforcement officers tending to wildlife issues to a reasonable number to sufficiently cover the State and marine waters.

7.1.4 Scale Unspecified

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.26 Educate law enforcement personnel that there may be unauthorized research projects taking place and to encourage them to investigate any activities that appear to be harmful to wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.2 Develop a team of personnel from government entities, conservation organizations and other stakeholders engaged in oil/gas spill response for marine and freshwater habitats to develop a feasible plan for oil spill response and/or to amend NJ's current oil spill response plan that clearly outlines each organizations responsibilities and an assessment and location list of available equipment for boom deployment during oil spills.

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.1.0.4 Engage government agencies, conservation partners and other stakeholders in constructive dialogues encouraging them to influence policy change and the creation of incentives through a habitat bill and/or municipal ordinances for backyard habitat.

8.1.0.15 Engage government agencies, conservation partners and other stakeholders in discussions encouraging and supporting the creation of laws and policies requiring vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

8.1.0.16 Engage local governments in discussions regarding the importance of them adopting/passing ordinances which require assessing and addressing secondary impacts (i.e., ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

8.1.0.17 Engage municipalities in constructive dialogue to identify and minimize destruction of areas prioritized for early succession forest management.

8.1.0.18 Engage NJDOT, NJ Transit Authority and other road management entities, wildlife conservation organizations/agencies (e.g., Division of Fish and Wildlife, New Jersey Conservation Foundation, Conserve Wildlife Foundation of NJ), and communities and citizens in discussions regarding the importance of and methods to enhance habitat connectivity, and work together to develop feasible strategies for ensuring that wildlife can disperse naturally and safely across roads and similar barriers to terrestrial and/or aquatic habitats.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.20 Organize a small focal group of government and non-government agencies/organizations responsible for decisions regarding beach/dune management to share and coordinate their goals so that comprehensive planning can attempt to meet all needs.

8.1.0.21 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation human-subsidized and/or overabundant, native species cause to local nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.22 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation invasive species cause to native nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.26 Coordinate across federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to woodland landowners to adopt or endorse consistent best management practices concerning controlled burns to maintain and/or improve forested habitat for wildlife.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.34 Work with the NJ Education Association and Department of Education to design curriculum and outdoor experimental learning opportunities, and provide training to teachers on implementation of these activities.

8.1.0.37 Enlist landowners and NJ citizens in the protection of and survey efforts for SGCN, in particular rare species, by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management and wildlife-related volunteer programs.

8.1.0.38 Engage partners, stakeholders and land managers in constructive dialogue promoting forest stewardship for SGCN that use core forests and forested corridors.

8.1.0.40 Encourage researchers, land managers, naturalists and enthusiasts to follow proper procedures for the coordination and/or permitting of research/management activities involving wildlife and sensitive habitats, and discourage activities that alter vegetation or wetlands, or cause harm or disturbance to wildlife.

8.1.0.42 Engage citizens, wildlife observers and photographers through discussions and distributable information regarding the importance of and encouraging implementing responsible and ethical behavior when observing wildlife by developing an alliance of wildlife photographers and widely circulating recommendations on how to reduce impact.

8.1.0.44 Engage conservation partners, stakeholders, government agencies and other land stewards in constructive dialogues encouraging their inclusion of controlled burns in forest and other stewardship plans.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.1.0.48 Form cooperative partnerships with transportation and shipment agencies and companies to facilitate habitat creation and enhancement away from and outside of project areas and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.2 Recruitment and retention activities

8.2.3 For wildlife watching

8.2.3.1 Develop and implement nature-focused tourism opportunities including wildlife viewing sites, interpretive signage highlighting unique ecosystems/habitats, and wildlife-related recreational opportunities that do not negatively impact SGCN or their habitats.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.7 Develop and provide (or otherwise make publicly available) educational programs and/or materials that describe the negative impacts of off-road vehicles and watercraft use in and adjacent to critical SGCN habitats, and the importance of confining such activities to more appropriate locations and/or seasons.

8.3.0.8 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate recreationists and encourage landowners to eliminate garbage in the vicinity of suitable wildlife habitat, in particular SGCN habitat. Information should include the detrimental impacts garbage may have on various wildlife species.

8.3.0.9 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners and land managers to include only native plants in landscaping and restoration projects. Provide information to assist them in detecting problematic establishment of invasive, non-indigenous plants.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.11 Develop and provide (or otherwise make publicly available) educational programs and/or materials to the public, wildlife-related professionals, foresters, etc., that describe the value of species that are often feared (e.g., snakes, bats, spiders, Allegheny woodrat) and/or deemed a "nuisance" (e.g., squirrel, deer, snapping turtle), and therefore, persecuted by people. Include information on tolerance, proper identification, eviction from human dwellings, how to minimize the animal's presence on the property, and/or how to live in harmony with the animal.

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.24 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

8.3.0.25 Develop educational outreach programs for landowners, nurseries and the general public regarding the negative impacts of invasive and non-native plants on our natural communities.

8.3.0.26 Develop educational outreach programs for private and public landowners and land managers regarding the importance of and how to manage core forests and forested corridors in a way that will be beneficial for SGCN, particularly endangered, threatened and special concern species.

8.3.0.27 Develop educational outreach programs for public and private landowners and land managers regarding the importance of structural habitat diversity, methods to increase diversity, and/or incentive programs available to increase habitat diversity.

8.3.0.28 Develop educational outreach programs for public and private landowners and land managers regarding the importance of managing grasslands for grassland-dependent species, methods of management, and/or incentive programs available.

8.3.0.30 Develop educational outreach programs for private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.5 Develop a plan that directs the creation or expansion of energy or utility rights-of-way in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.6 Develop a plan that directs the creation or expansion of roads and railroads or the re-establishment of abandoned railroads within and adjacent to critical forested habitats in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.8 Develop a plan that focuses on strategies for oil pipelines to avoid sensitive habitats that would be highly impacted by oil spills.

9.1.0.9 Develop a plan that focuses on strategies to minimize the creation of renewable energy farms (e.g., solar, wind) and related infrastructures within and their impacts on forested habitats and the wildlife community.

9.1.0.10 Develop a plan that focuses on strategies to minimize the impacts of mining on critical forested habitats.

9.1.0.11 Develop a plan that focuses on strategies to minimize the impacts of power plants on critical forested habitats and the wildlife community.

9.1.0.13 Develop a plan to minimize agriculture that would result in groundwater withdrawal in critical forested areas.

9.1.0.14 Develop a plan to minimize development that would result in groundwater withdrawal in critical forested areas.

9.1.0.15 Develop a plan to minimize fragmentation of terrestrial and aquatic habitats by roads.

9.1.0.16 Develop a plan to minimize new lawnscapes and preserve natural vegetation within and adjacent to critical forest areas.

9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

9.1.0.21 Develop a plan to minimize the use of any-sized dam in critical forested areas.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.2 Organizational strategic and CMS planning

9.2.1 Organizational strategic and operational planning

9.2.1.1 Identify and codify legal ORV access areas on state lands.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.5 Develop response plans to address disease outbreaks within wildlife populations, in particular SGCN.

9.3.1.7 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.10 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.15 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.1.16 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3 Habitat management planning

9.3.3.5 Develop a management plan using forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

9.3.3.7 Develop a management plan to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

9.3.3.8 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.3.13 Develop a management plan that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas and prevents or ameliorates near-term impacts of climate change throughout the State, but in particular within the coastal and Delaware Bay areas.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.16 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.3.17 Develop a management plan for prescribed burning that will benefit Pinelands dependent species and increase or maintain habitat quality for these species in the Pinelands.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.21 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.3.26 Develop a management plan for parcels of suitable size to be managed for native herbaceous plant species that support breeding grassland dependent species.

9.3.3.28 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.3.29 Develop habitat management plans aimed at reducing or eliminating negative impacts of ORVs.

9.3.3.32 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3.34 Include controlled burn prescriptions in forest and stewardship plans to improve wildlife habitat.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.12 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed solar farm projects to reduce habitat fragmentation and minimize impacts on wildlife.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.2 Provide technical support to public and private landowners and land managers for controlling invasive, native and non-native plant species in order to increase structural habitat diversity.

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.7 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on the importance of maintaining habitat connectivity, minimizing fragmentation, and the use of CHANJ products to help them target areas for such planning.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.11 Provide educational resources, training programs, and on-the-ground guidance to private and public landowners and land managers on the benefits of and for creating young forest and early succession habitat for SGCN.

11.2.0.12 Provide educational resources and technical support to public landowners and land managers for managing grasslands for grassland-dependent species.

11.2.0.15 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and landowners about the importance of retaining and in an effort to protect, create, enhance and/or restore vegetation along aquatic habitats.

11.2.0.17 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of vernal pools and the protection, enhancement and/or restoration of biologically appropriate buffers.

11.2.0.22 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

11.2.0.23 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to SGCN habitats to promote the protection and/or enhancement of those adjacent habitats to increase the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and that connect conserved SGCN habitats.

11.2.0.24 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers on how to manage vegetated roadside areas (e.g., mowing, brush-hogging, etc.) on a schedule that avoids peak activity periods for wildlife and therefore, minimizes harm.

11.2.0.25 Provide educational resources, training programs, and on-the-ground guidance to resource managers regarding the assessment of and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) related to residential and commercial development.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.1 Engage partners and stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.3 Provide educational resources, training programs, and on-the-ground guidance to DOD to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop and implement forest management and other practices that minimize disturbances to SGCN (i.e., beyond their federal requirements).

11.2.1.5 Provide educational resources, training programs, and on-the-ground guidance to municipalities, state and federal agency resource managers on tasks such as writing and integrating Beach Management Plans into other management documents.

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

11.2.2 With private landowners

11.2.2.1 Provide technical support to farming operations and woodland landowners on ways to decrease clean farming (edge-to-edge) practices and create ecotones to benefit bobwhite and other species dependent on early successional habitat.

100 Law and Policy

100. Legislation

100.1.2 National Level

100.1.2.1 Create legislation to establish markets for warm-season grasses to increase the permanency of this crop on the landscape.

100.1.3 Sub-national Level

100.1.3.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.3.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.4 County and Local

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.3 Expand the acreages and enhance the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN through local ordinances.

100.1.4.14 Adopt/pass local ordinances which require assessing and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100.1.5.5 Develop legislation to provide financial support for the New Jersey Invasive Species Strike Team.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.5 Develop policies that will promote improved and secure habitat connections between conserved SGCN habitats.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.12 Develop policies that promote the preservation and protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.23 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.24 Create legislation to establish markets for warm-season grasses to increase the permanency of this crop on the landscape.

100.3.0.31 Create or expand tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMPs.

100.3.0.32 Coordinate regulations across agencies to maximize availability of and enrollment in existing Forestry Stewardship Programs (e.g., "Woodland Stewards", Farm Bill, partners, etc.) to maintain and/or improve forest habitat.

100.3.0.38 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.3.0.39 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.3.0.40 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.45 Increase the controlled burn season to focus on restoring vegetative communities.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.48 Propose new State law or regulation mandating that a State-level "development impact fee" be assessed on all new development approved by municipalities (via the Municipal Land Use Law processes), and dedicate such monies to the development and implementation of regional Habitat Conservation Plans (or existing plans/programs serving the same regional function).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.53 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded rights-of-way corridors associated with energy transport/transmission.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100.3.0.73 Develop regulations that would exempt the conversion of lawns to native vegetation (beneficial to wildlife) from local lawn ordinances.

100.3.2 State Land Acquisition Programs

100.3.2.1 Increase opportunities for habitat restoration by making any necessary policy changes to state, federal and local land acquisition programs (e.g., Green Acres, Blue Acres, etc.) to allow for acquisition within abandoned or failing bay shore communities, including mechanisms to relocate displaced people and infrastructure.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.2 Create a policy that requires the NJ DEP to incorporate scientific information regarding climate change and sea level rise (e.g., predictions, habitat management/acquisition efforts to enhance resilience to inundation) on their websites and to work with other government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

100.4.0.3 Develop policies for mandatory buffer strips on preserved farmlands and state-owned agricultural lands.

100.4.0.8 Develop a white paper addressing the impacts that existing, new or expanded rights-of-way have upon wildlife, wildlife habitats and habitat connectivity.

100.4.0.10 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.4.0.11 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.4.0.12 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.4.0.13 Develop policies for different circumstances (e.g., roadsides and medians, riparian, aquatic and terrestrial habitats) that outline appropriate habitat/vegetation management strategies and schedules to minimize risks to and benefit wildlife.

100.4.0.14 Develop policies to facilitate agreements between eligible entities to manage appropriate conserved lands for grassland-dependent species, and to have access to/obtain restoration funds.

100.4.0.16 Develop policies to implement habitat management strategies that will increase the structural diversity surrounding areas used for energy, mining, and transportation and service corridors which include but are not limited to the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-

100.4.0.17 Develop policies to implement habitat management strategies, including prescribed burns, that will increase the structural diversity on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies to control and reduce the impacts of invasive, non-native species in order to increase structural habitat diversity.

100.4.0.18 Develop policies to minimize the extent of infrastructure associated with energy and service corridors or areas (e.g., wind and solar farms, pipelines, utility lines) and that require the implementation of habitat management strategies that will increase the structural diversity in the area including (e.g., the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides).

100.4.0.19 Develop regulations that will minimize the creation of new barriers, remove or replace current barriers with appropriately-sized systems to accommodate wildlife dispersal, and to minimize road widening and traffic volume increases within critical wildlife habitat areas.

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.24 Develop policies to provide financial support for the New Jersey Invasive Species Strike Team.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Beach Tiger Beetles

Focal species that comprise this Conservation Target:

Little White Tiger Beetle | Northeastern Beach Tiger Beetle | Southeastern Beach Tiger Beet

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:
- 1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.1.1.2 Loss, alteration and/or degradation of habitat.
- 1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats:
- 1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.2.1.2 Loss, alteration and/or degradation of habitat.
- 1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:
- 1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.3.1.2 Loss, alteration and/or degradation of habitat.
- 1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

5 Biological Resource Use

5.1 Hunting and Collecting Terrestrial Animals

5.1.1 Intentional Use (Avg. Score: 1.00)

NJ Specific Threats:
- 5.1.1.1 Illegal collection of wildlife can have detrimental impacts on populations.

5.2 Gathering Terrestrial Plants

5.2.2 Unintentional effects (Avg. Score: 1.00)

NJ Specific Threats:
- 5.2.2.1 Stepping on nests or young/hatchling animals.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized) (Avg. Score: 2.33)

NJ Specific Threats:

6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.

6.1.1.5 Vehicle use on beaches can cause disturbance, harms breeding and foraging habitats, and can cause direct mortality of beach-nesting birds.

6.1.1.6 Off-road vehicles can be a mechanism of transference of wildlife diseases and invasive plant species if gear and apparel are not properly sanitized between sites.

6.2 Military Exercises

6.2.1 Military exercises (Avg. Score: 0.33)

NJ Specific Threats:

6.2.1.3 Lack of opportunity for non-federal wildlife managers to influence activities on military bases may result in detrimental impacts to SGCN and/or missed opportunities to engage in projects that benefit SGCN.

7 Natural Systems Modifications

7.1 Fire and Fire Suppression

7.1.1 Increase in Fire Frequency/Intensity (Avg. Score: 0.33)

NJ Specific Threats:

7.1.1.1 Increase in frequency and intensity of wild fires as a result of droughts and heat waves drying out vegetation and litter.

7.1.1.2 Increase in frequency of wild fires as a result of illegal activities.

7.1.1.3 Unnatural fire regimes occurring as a result of military exercises.

7.1.2 Suppression of Fire Frequency/Intensity (Avg. Score: 0.67)

NJ Specific Threats:

7.1.2.1 Shift in vegetative communities as a result of suppression of natural fires.

7.3 Other Ecosystem Modifications

7.3.1 Shoreline Stabilization (Avg. Score: 2.00)

NJ Specific Threats:

7.3.1.1 Efforts to stabilize barrier islands and shorelines, including jetties, groins, bulkheads, interfere with the natural geological processes needed to create and maintain high quality habitat for beach strand species.

7.3.1.2 Efforts to stabilize stream corridors, particularly near roads and infrastructure, in which vegetated and dynamic shorelines are replaced with unvegetated and rigid structures such as rip-rap, gabion, concrete raceways and bulkheads interfere with fish spawning, nursery and foraging areas.

7.3.5 Poor habitat management (Avg. Score: 1.00)

NJ Specific Threats:

7.3.5.1 Improper or poorly scheduled maintenance of man-made corridors (e.g., roadsides and medians) can cause direct mortality to and may reduce productivity of wildlife.

7.3.5.3 Vegetation clearing removes terrestrial and riparian corridors for animal movement, shelter, and resting areas.

7.3.5.5 Habitat management that alters or removes vegetation without implementing long-term management increases the risk of invasive and exotic plants establishing themselves, outcompeting native vegetation.

7.3.5.6 Habitat management, including that which occurs on public and private lands, that does not consider timing and species' behaviors can result in the direct mortality and/or alteration or loss of habitat.

7.3.5.7 Improperly planned habitat management and/or mitigation efforts along roadsides and within the medians can attract wildlife and increase the risk of vehicle strikes.

7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

8 Invasive and Other Problematic Species, Genes and Diseases

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.3 Agricultural and Forestry Effluents

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture (Avg. Score: 1.00)

NJ Specific Threats: 9.3.5.4 Improper use of current insecticides, such as those containing esfenvalerate, prallethrin, or piperonyl butoxide, or past use of pesticides containing chlordane still present in the soils, are toxic to various wildlife species, and can cause injury, mortality, or other effects that impair population viability.

9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 2.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.4 Storms and Flooding

11.4.1 Storms and flooding (Avg. Score: 3.00)

NJ Specific Threats: 11.4.1.1 Extreme storms and flooding events threaten aquatic and marine wildlife through habitat degradation and alteration, including alterations to off-shore or back-bay benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic and marine wildlife.

11.4.1.2 Potentially damage coastal habitats, including beach- and marsh-nesting bird habitats and interdunal wetlands, and can increase marsh erosion.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 3.00)

NJ Specific Threats: 12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.2 Lack of up-to-date existing information (Avg. Score: 3.00)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.3 Need to answer research question (Avg. Score: 2.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.4 Need to develop new technique (Avg. Score: 2.00)

NJ Specific Threats: 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 1.00)

NJ Specific Threats:

12.3.0.1 Regulatory habitat protections within state land use regulations are spatially limited to specific geographic areas (e.g., Pinelands, Coastal Area) or geographic features (e.g., wetlands, streams) and so fail to protect critical habitats that exist outside of these regulated areas.

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 1.00)

NJ Specific Threats:

12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.

12.4.0.3 Lack of internal understanding regarding beneficial habitat impacts of storm events leads to policies and practices that reverse or decrease such beneficial effects (e.g., beach-filling, shoreline hardening, "hazard" tree and log removal from forests, etc.

12.4.0.6 Techniques for ecological management or restoration of shorelines are not fully developed or evaluated for effectiveness for target and non-target SGCN in coastal areas.

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 2.00)

NJ Specific Threats:

14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 2.00)

NJ Specific Threats:

14.2.1.2 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various aquatic and riparian management practices.

14.2.1.3 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various coastal management practices.

14.2.1.4 Need to develop greater understanding of and support for efforts implemented to maintain disturbance-free habitats that allow coastal wildlife populations to thrive alongside human residential and recreational uses.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 1.00)

NJ Specific Threats: 15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.3 Secure and promote the protection/restoration of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.9 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing Forestry Stewardship Programs.

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.12 Create incentives (non-monetary and/or monetary) for land developers to redevelop abandoned areas (e.g., shopping centers, office complexes) to minimize the loss of natural habitats and reduce the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.18 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and land managers to control and reduce the impacts of invasive, native and non-native species in order to increase structural habitat diversity.

1.2.1.20 Coordinate across government agencies and non-government organizations to create or expand upon tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMP's.

1.2.1.22 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to horse/livestock farm owners and managers to increase structural habitat diversity in and around the farms by managing vegetation for a variety of species, in particular, farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

1.2.1.23 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to provide cost shares and/or plan approvals for management based on management approaches and prescriptions.

1.2.1.24 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners, with habitat of suitable patch size to support breeding grassland-dependent species, to alter the timing of vegetation management to benefit grassland and pollinator species.

1.2.1.25 Create incentives (non-monetary and/or monetary) within State regulations to assist and programs to deliver those incentives to aquaculture growers to relocate, for example, from intertidal to subtidal lease areas through buyouts of leases or microloans, and/or promoting on-lease conservation measures used by aquaculture growers (such as the implementation of conservation easements, use of living shorelines, incorporation of BMPs for habitat protection, etc.) for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

1.2.1.28 Create incentives to implement dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

2 Direct Management of Natural Resources

2.3 Fire management

2.3.2 Fuel reduction

2.3.2.1 Prevent wildfires by reducing natural fuel (e.g., leaf litter).

2.3.3 Prescribed burning

2.3.3.1 Evaluate different management techniques of prescribed burns that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

2.3.3.3 Conduct prescribed burning to improve wildlife habitat.

2.6 Hazard or infrastructure removal

2.6.6 Shoreline armoring removal

2.6.6.1 Remove shoreline armoring to reduce its impacts on aquatic habitats.

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.5 Implement biologically safe and appropriate control/management strategies, and where appropriate, eradication strategies to reduce the impacts and/or limit the distribution of invasive and/or non-native plant species within or near aquatic systems using methods that will provide the most protection to the aquatic and riparian ecological system, and minimize disturbance to the soil and wildlife. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.9 Living shorelines

2.9.1 Beach renourishment

2.9.1.1 Implement best management practices for using mined sand or dredged material to improve habitat for wildlife, particularly for spawning horseshoe crabs and migrating shorebirds.

2.9.1.4 Implement beach renourishment strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimizes harm to wildlife, particularly SGCN.

2.9.1.5 Expand the acreages and enhance the effective size of SGCN habitats by utilizing beach renourishment to restore adjacent, less optimal or unsuitable, habitats.

2.9.1.6 Reclaim degraded rare species habitats using beach renourishment, when appropriate, to restore habitat value for the documented/target SGCN.

2.9.1.7 Protect significant natural and/or unique communities by implementing best management practices for beach renourishment, when applicable.

2.9.1.8 Minimize habitat loss of critical coastal beach habitats that provide nesting, migrating, and wintering areas for birds and other coastal species by maintaining or enhancing these areas through beach renourishment.

2.9.1.10 Repair beaches associated with marshes damaged by salt hay farm/dike abandonment and restore degraded sites for targeted SGCN species and their habitats.

2.9.1.14 Implement best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated beach habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.9.1.16 Prevent or ameliorate near-term impacts of climate change throughout the State but in particular within the coastal and Delaware Bay areas by implementing habitat management strategies that will establish/improve habitat resilience, such as beach renourishment, that benefits wildlife inhabiting these areas.

2.9.2 Erosion control structures

2.9.2.1 Install breakwaters in the form of living shorelines to reduce the impact of wave erosion while preserving the natural character of the site.

2.9.3 Sand dune restoration

2.9.3.1 Prevent or ameliorate near-term impacts of climate change throughout the State but in particular within the coastal and Delaware Bay areas by implementing habitat management strategies that will establish/improve habitat resilience, such as sand dune restoration, that benefits wildlife inhabiting these areas.

2.9.3.2 Implement sand dune restoration strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimizes harm to wildlife, particularly SGCN.

2.9.3.3 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through sand dune restoration.

2.9.3.4 Reclaim degraded rare species habitats using sand dune restoration needed to restore habitat value for the documented/target SGCN.

2.9.3.5 Protect significant natural and/or unique communities by implementing best management practices for sand dune restoration.

2.9.3.6 Minimize habitat loss of critical coastal dune habitats that provide nesting, migrating, and wintering areas for birds and other coastal species by maintaining or enhancing these areas through sand dune restoration.

2.9.3.10 Implement sand dune restoration strategies on state and other conservation lands to enhance food availability for migratory species (birds, bats, invertebrates).

2.9.3.11 Conduct sand dune restoration to maintain, enhance and/or create feeding and roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State and evaluate the effectiveness of such management.

2.9.3.12 Implement best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated sand dune habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.2 Improve the availability of prey/food resources through terrestrial and aquatic plantings and habitat restoration for SGCN populations, in particular for those populations thought to be limited due wholly or in part to a lack of (or contaminated) food resources, and for migratory species (birds, bats, invertebrates).

2.10.0.4 Restore and/or enhance suitable travel corridors connecting conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.8 Protect significant natural and/or unique communities by implementing best management practices when conducting habitat restoration strategies.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.10 Minimize the loss of important habitats (e.g., coastal scrub-shrub and grassy habitats, high and low marsh habitats, etc.) that provide nesting, migrating, and wintering areas for SGCN birds and other coastal and marsh-dependent species through habitat restoration efforts.

2.10.0.11 Restore and/or enhance critical migratory terrestrial and aquatic habitats (e.g., beach, grasslands, forest, scrub-shrub, etc.) for songbirds, raptors, shorebirds, waterfowl, bats and invertebrates through habitat restoration efforts and expand habitat restoration to adjacent private lands to increase the effective size of the habitat.

2.10.0.12 Create and/or maintain scrub-shrub habitats through revegetation efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.15 Restore and/or enhance terrestrial and aquatic habitats proximate to but not adjacent to roads and other transportation corridors for terrestrial-bound SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.3 Create suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats through vegetation management.

2.11.0.9 Minimize habitat loss of critical coastal habitats that provide nesting, migrating, and wintering areas for birds and other coastal species by maintaining or enhancing these areas through vegetation management.

2.11.0.23 Implement appropriate habitat management actions in areas where natural disturbances, such as wildfire, have been precluded.

2.11.0.31 In areas where vegetative communities are shifting due to fire suppression and controlled burns are not feasible, manage vegetation to improve wildlife habitat.

2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.

2.11.0.40 Increase structural habitat diversity surrounding areas used for energy, mining, and transportation and service corridors by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides, and avoid managing habitat during the breeding seasons for ground-nesting birds, reptiles, amphibians and small mammals.

2.11.0.41 Increase structural habitat diversity through the implementation of a variety of vegetation management practices such a prescribed burns (either increasing or decreasing their frequency depending on the site and objective), plantings, etc. that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.43 Manage forests to increase variation in age structure and composition using BMPs that promote and maintain functioning ecological forest-based systems and biological diversity.

2.11.0.45 Regularly and/or rotationally create young forest habitat in targeted areas to maintain and regenerate a mosaic of upland forest habitats that will benefit shrub- and young forest-dependent species.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.6 Conduct long-term studies on resident and migratory SGCN to determine if there are changes to the populations' demography (productivity, survival, dispersal) and/or to their critical and/or supporting habitats (i.e., diminishing in value, acreage or connectivity, etc.), in particular changes that would not maintain SGCN at viable levels for species populations. Update data and GIS maps; provide updated information to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.14 Identify areas with invasive, aquatic plants and animals and collect a detailed baseline assessment of the species' status and distribution. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort. Researchers and contractors performing Forest Stewardship Inventories and/or Plans on state lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.0.0.15 Conduct long-term monitoring of areas identified as having invasive, aquatic plants and animals to track the species' status/progress over time with or without the implementation of management strategies. Areas without management strategies should be assessed and prioritized for management/control. Areas where management strategies are being implemented should include an assessment of the management effort and identify/recommend and implement necessary changes to improve its success. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort.

3.0.0.23 Identify (through wildlife and aquatic system surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and research water quality parameters for all [types of] aquatic systems for various SGCN populations.

3.0.0.26 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species including objectives and guidance pertaining to and the condition/status of critical and supporting habitats.

3.0.0.27 Evaluate the effectiveness of strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals through research and monitoring. Develop and provide NJ DEP and other appropriate governing agencies/commissions a summary of findings and recommendations to improve such efforts.

3.0.0.28 Evaluate best management practices for using mined sand or dredged material to improve habitat for wildlife, particularly for spawning horseshoe crabs and migrating shorebirds.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.7 Track (via a database that includes a GIS component) and research problematic species and diseases to determine their distribution, impacts on SGCN wildlife/wildlife communities, and develop potential control measures.

3.2.0.8 Implement and conduct long-term monitoring of control measures aimed at minimizing the impacts of problematic species and/or diseases to evaluate the effectiveness of such efforts and to identify and incorporate additional strategies as appropriate.

3.2.0.18 Conduct baseline surveys/inventories to better understand the distribution of fish and invertebrate (including freshwater mussels) populations.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.2 Age, size and sex structure

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.3 Baseline inventory

3.2.3.9 Investigate hazardous environmental issues that may impact grassland invertebrates.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.6 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) that could, through revegetation and/or enhancement efforts, become suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN.

3.3.1.7 Map and prioritize existing and potential areas for early succession forest management. Share the results with state, county and municipal planners.

3.3.1.8 Assess the availability and suitability of forest habitats for SGCN species (particularly reptiles and amphibians, birds, pollinators, and tiger beetles) in southern forests since Superstorm Sandy.

3.3.1.10 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and document fish SGCN habitats by plotting their distributions in GIS and submitting the data to the State for integration into the DEP's Biotics database.

3.3.1.16 Gather "best information" for spatial modeling and update/create a current model/depiction of anticipated habitat shifts from sea-level rise, flooding, etc.

3.3.1.17 Identify and map undeveloped roads and trails in all conserved forests, and create a database of locations. Integrate information regarding potentially sensitive areas.

3.3.1.18 Conduct an assessment using available data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels.

3.3.1.19 Identify and codify legal ORV access areas on state (and if appropriate, other conserved) lands. Provide GIS mapping to the landowner for potential use in directing such recreational activities.

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.2 Monitoring

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.8 Evaluate the effectiveness of current prescribed burning practices on Pinelands dependent species.

3.3.2.9 Investigate the effectiveness of various silviculture techniques for enhancing forests for forest-dependent SGCN.

3.3.2.10 Evaluate the efficacy and success of different management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.3.2.15 Investigate the effectiveness of management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.3.2.20 Once a system is developed for reporting and qualifying new locations of invasive species, develop, implement and monitor/evaluate invasive species removal strategies at identified locations. Priority should be given to those areas critical to SGCN and/or contain unique and/or rare plant communities supporting SGCN and/or other fish/wildlife species.

3.3.2.22 Conduct short- and long-term monitoring of the current natural processes affecting sediment transport along the coast. Share findings with organizations/agencies attempting to design beach nourishment projects in a manner that will be beneficial to wildlife.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.3 Develop/improve management techniques that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.5 Develop best management practices for using mined sand or dredged material to improve habitat for wildlife, particularly for spawning horseshoe crabs and migrating shorebirds.

3.5.3.9 Develop strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.13 Developing engineering standards that embrace both shore protection/resiliency and habitat creation for shorebirds, horseshoe crabs and other coastal species along the Atlantic and Delaware Bay coasts.

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.3.16 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.3.19 Work with foresters to develop prescribed burning practices for Pinelands dependent species that increase or maintain habitat quality for these species in the Pinelands.

3.5.3.21 Develop management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.24 Based on research, modify management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.5 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

3.5.4.6 Investigate the feasibility of mitigating for the impacts of contaminants to vulnerable wildlife, particularly SGCN. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.5.4.14 Develop and implement agreements, and update existing agreements, with government agencies regarding the protection of critical SGCN habitats (e.g., significant breeding populations of beach nesting birds, colonial waterbird nesting areas, bat colonies, etc.).

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.18 Investigate the effectiveness of survey techniques through selected "ground truthing" and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

3.5.4.21 Develop BMPs to address problematic species and diseases of unknown origin.

4 Education

4.1 Educator/Instructor training

4.1.0 Public education

4.1.0.1 Provide educational resources and training programs to private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

4.1.1 Aquatic resource education

4.1.1.1 Provide educational resources and training programs to teachers in aquatic resource education that includes information regarding climate change and sea-level rise for incorporation into the class curriculum and/or as the focus of school field trips.

4.1.1.2 Provide educational resources and training programs to teachers in aquatic resource education that includes information regarding how coastal stabilization negatively impacts wildlife by preventing natural processes for incorporation into the class curriculum and/or as the focus of school field trips.

5 Facilities and Areas

5.15 Wildlife Management Areas

5.15.6 Roads

5.15.6.1 Clearly post areas/roads where vehicle access is permitted.

5.15.6.2 Clearly post areas/trails where vehicle access is not permitted.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.5 Secure and protect critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.8 Secure and protect scrub-shrub habitats for SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.8 Promote the protection of scrub-shrub habitats for SGCN through conservation area designations.

6.4 Private lands agreements

6.4.0 Private land agreement strategies

6.4.0.1 Enter into private lands agreements to expand control burns on private lands, in particular those adjacent to conserved lands to improve SGCN habitats.

7 Law Enforcement

7.1 Law enforcement

7.1.3 Sub-national Level

7.1.3.2 Increase the number of law enforcement officers tending to wildlife issues to a reasonable number to sufficiently cover the State and marine waters.

7.1.4 Scale Unspecified

7.1.4.5 Enforce current policies and/or regulations to increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal SGCN, and implement and enforce amended policies/regulations.

7.1.4.6 Recruit law enforcement to assist in the protection and enhancement of SGCN populations, in particular endangered species, through improved awareness of species through trainings, partnerships, and other methods. Information should include but is not limited to: 1) Issues concerning illegal collection of reptiles, 2) Persecution of rare snakes, 3) Illegal recreational activities on public lands (e.g., off-road vehicles) and their impact on wildlife, 4) Identification of sensitive areas, critical sites and/or "hot-spots" for collection.

7.1.4.7 Increase law enforcement presence to enforce regulations governing recreational activities (e.g., the use of personal watercraft and off road vehicles, caving, rock climbing, etc.) on conserved lands and within other sensitive habitats, and discourage activities that cause harm or disturbance to vegetation, wetlands, fish and wildlife.

7.1.4.9 Implement policies that improve and secure habitat connections between conserved SGCN habitats.

7.1.4.10 Implement policies that promotes expanding acreages and enhances the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

7.1.4.11 Implement and enforce policies/regulations that will increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.19 Implement policies that protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

7.1.4.26 Educate law enforcement personnel that there may be unauthorized research projects taking place and to encourage them to investigate any activities that appear to be harmful to wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.2 Develop a team of personnel from government entities, conservation organizations and other stakeholders engaged in oil/gas spill response for marine and freshwater habitats to develop a feasible plan for oil spill response and/or to amend NJ's current oil spill response plan that clearly outlines each organizations responsibilities and an assessment and location list of available equipment for boom deployment during oil spills.

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.1.0.4 Engage government agencies, conservation partners and other stakeholders in constructive dialogues encouraging them to influence policy change and the creation of incentives through a habitat bill and/or municipal ordinances for backyard habitat.

8.1.0.6 Engage government agencies, conservation partners and other stakeholders in discussions focused on sharing information regarding coastal and marine critical wildlife habitats, developing comprehensive mapping to assist in reducing impacts of energy production activities, and establishing a long-term monitoring program to update the data. Ensure this information is available to appropriate personnel for planning or response measures.

8.1.0.15 Engage government agencies, conservation partners and other stakeholders in discussions encouraging and supporting the creation of laws and policies requiring vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

8.1.0.16 Engage local governments in discussions regarding the importance of them adopting/passing ordinances which require assessing and addressing secondary impacts (i.e., ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

8.1.0.17 Engage municipalities in constructive dialogue to identify and minimize destruction of areas prioritized for early succession forest management.

8.1.0.18 Engage NJDOT, NJ Transit Authority and other road management entities, wildlife conservation organizations/agencies (e.g., Division of Fish and Wildlife, New Jersey Conservation Foundation, Conserve Wildlife Foundation of NJ), and communities and citizens in discussions regarding the importance of and methods to enhance habitat connectivity, and work together to develop feasible strategies for ensuring that wildlife can disperse naturally and safely across roads and similar barriers to terrestrial and/or aquatic habitats.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.20 Organize a small focal group of government and non-government agencies/organizations responsible for decisions regarding beach/dune management to share and coordinate their goals so that comprehensive planning can attempt to meet all needs.

8.1.0.21 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation human-subsidized and/or overabundant, native species cause to local nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.22 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation invasive species cause to native nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.26 Coordinate across federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to woodland landowners to adopt or endorse consistent best management practices concerning controlled burns to maintain and/or improve forested habitat for wildlife.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.34 Work with the NJ Education Association and Department of Education to design curriculum and outdoor experimental learning opportunities, and provide training to teachers on implementation of these activities.

8.1.0.37 Enlist landowners and NJ citizens in the protection of and survey efforts for SGCN, in particular rare species, by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management and wildlife-related volunteer programs.

8.1.0.38 Engage partners, stakeholders and land managers in constructive dialogue promoting forest stewardship for SGCN that use core forests and forested corridors.

8.1.0.40 Encourage researchers, land managers, naturalists and enthusiasts to follow proper procedures for the coordination and/or permitting of research/management activities involving wildlife and sensitive habitats, and discourage activities that alter vegetation or wetlands, or cause harm or disturbance to wildlife.

8.1.0.41 Engage beach-owning entities (e.g., government, non-government and non-profit organizations, and landowners) in a constructive dialogue to develop guidelines for management of beach/dune communities and to ensure that each group is educated and aware of the needs of the other groups.

8.1.0.42 Engage citizens, wildlife observers and photographers through discussions and distributable information regarding the importance of and encouraging implementing responsible and ethical behavior when observing wildlife by developing an alliance of wildlife photographers and widely circulating recommendations on how to reduce impact.

8.1.0.44 Engage conservation partners, stakeholders, government agencies and other land stewards in constructive dialogues encouraging their inclusion of controlled burns in forest and other stewardship plans.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.1.0.48 Form cooperative partnerships with transportation and shipment agencies and companies to facilitate habitat creation and enhancement away from and outside of project areas and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.2 Recruitment and retention activities

8.2.3 For wildlife watching

8.2.3.1 Develop and implement nature-focused tourism opportunities including wildlife viewing sites, interpretive signage highlighting unique ecosystems/habitats, and wildlife-related recreational opportunities that do not negatively impact SGCN or their habitats.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.7 Develop and provide (or otherwise make publicly available) educational programs and/or materials that describe the negative impacts of off-road vehicles and watercraft use in and adjacent to critical SGCN habitats, and the importance of confining such activities to more appropriate locations and/or seasons.

8.3.0.8 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate recreationists and encourage landowners to eliminate garbage in the vicinity of suitable wildlife habitat, in particular SGCN habitat. Information should include the detrimental impacts garbage may have on various wildlife species.

8.3.0.9 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners and land managers to include only native plants in landscaping and restoration projects. Provide information to assist them in detecting problematic establishment of invasive, non-indigenous plants.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.11 Develop and provide (or otherwise make publicly available) educational programs and/or materials to the public, wildlife-related professionals, foresters, etc., that describe the value of species that are often feared (e.g., snakes, bats, spiders, Allegheny woodrat) and/or deemed a "nuisance" (e.g., squirrel, deer, snapping turtle), and therefore, persecuted by people. Include information on tolerance, proper identification, eviction from human dwellings, how to minimize the animal's presence on the property, and/or how to live in harmony with the animal.

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.21 Develop an educational outreach program for the general public, in particular those within and adjacent to coastal and riparian areas on the realities of sea-level rise to help citizens living in these areas understand how this will affect them, how coastal stabilization negatively impacts wildlife by preventing natural processes, and how their decisions impact species.

8.3.0.24 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

8.3.0.25 Develop educational outreach programs for landowners, nurseries and the general public regarding the negative impacts of invasive and non-native plants on our natural communities.

8.3.0.26 Develop educational outreach programs for private and public landowners and land managers regarding the importance of and how to manage core forests and forested corridors in a way that will be beneficial for SGCN, particularly endangered, threatened and special concern species.

8.3.0.27 Develop educational outreach programs for public and private landowners and land managers regarding the importance of structural habitat diversity, methods to increase diversity, and/or incentive programs available to increase habitat diversity.

8.3.0.30 Develop educational outreach programs for private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.5 Develop a plan that directs the creation or expansion of energy or utility rights-of-way in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.6 Develop a plan that directs the creation or expansion of roads and railroads or the re-establishment of abandoned railroads within and adjacent to critical forested habitats in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.8 Develop a plan that focuses on strategies for oil pipelines to avoid sensitive habitats that would be highly impacted by oil spills.

9.1.0.9 Develop a plan that focuses on strategies to minimize the creation of renewable energy farms (e.g., solar, wind) and related infrastructures within and their impacts on forested habitats and the wildlife community.

9.1.0.10 Develop a plan that focuses on strategies to minimize the impacts of mining on critical forested habitats.

9.1.0.11 Develop a plan that focuses on strategies to minimize the impacts of power plants on critical forested habitats and the wildlife community.

9.1.0.13 Develop a plan to minimize agriculture that would result in groundwater withdrawal in critical forested areas.

9.1.0.15 Develop a plan to minimize fragmentation of terrestrial and aquatic habitats by roads.

9.1.0.16 Develop a plan to minimize new lawnscapes and preserve natural vegetation within and adjacent to critical forest areas.

9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.2 Organizational strategic and CMS planning

9.2.1 Organizational strategic and operational planning

9.2.1.1 Identify and codify legal ORV access areas on state lands.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.5 Develop response plans to address disease outbreaks within wildlife populations, in particular SGCN.

9.3.1.7 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.10 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.15 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.1.16 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3 Habitat management planning

9.3.3.5 Develop a management plan using forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

9.3.3.8 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.3.13 Develop a management plan that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas and prevents or ameliorates near-term impacts of climate change throughout the State, but in particular within the coastal and Delaware Bay areas.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.16 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.3.17 Develop a management plan for prescribed burning that will benefit Pinelands dependent species and increase or maintain habitat quality for these species in the Pinelands.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.21 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.3.28 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.3.29 Develop habitat management plans aimed at reducing or eliminating negative impacts of ORVs.

9.3.3.32 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3.34 Include controlled burn prescriptions in forest and stewardship plans to improve wildlife habitat.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.12 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed solar farm projects to reduce habitat fragmentation and minimize impacts on wildlife.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.2 Provide technical support to public and private landowners and land managers for controlling invasive, native and non-native plant species in order to increase structural habitat diversity.

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.7 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on the importance of maintaining habitat connectivity, minimizing fragmentation, and the use of CHANJ products to help them target areas for such planning.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.11 Provide educational resources, training programs, and on-the-ground guidance to private and public landowners and land managers on the benefits of and for creating young forest and early succession habitat for SGCN.

11.2.0.15 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and landowners about the importance of retaining and in an effort to protect, create, enhance and/or restore vegetation along aquatic habitats.

11.2.0.17 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of vernal pools and the protection, enhancement and/or restoration of biologically appropriate buffers.

11.2.0.19 Provide educational resources and technical support to public and private landowners and land managers to promote the protection and/or enhancement of scrub-shrub habitats for SGCN.

11.2.0.20 Provide educational resources and technical support to public and private landowners and land managers to promote the protection and/or enhancement of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN.

11.2.0.22 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

11.2.0.23 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to SGCN habitats to promote the protection and/or enhancement of those adjacent habitats to increase the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and that connect conserved SGCN habitats.

11.2.0.25 Provide educational resources, training programs, and on-the-ground guidance to resource managers regarding the assessment of and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) related to residential and commercial development.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.1 Engage partners and stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.3 Provide educational resources, training programs, and on-the-ground guidance to DOD to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop and implement forest management and other practices that minimize disturbances to SGCN (i.e., beyond their federal requirements).

11.2.1.5 Provide educational resources, training programs, and on-the-ground guidance to municipalities, state and federal agency resource managers on tasks such as writing and integrating Beach Management Plans into other management documents.

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

100 Law and Policy

100. Legislation

100.1.3 Sub-national Level

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.4 County and Local

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.3 Expand the acreages and enhance the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN through local ordinances.

100.1.4.8 Secure critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through local ordinances.

100.1.4.14 Adopt/pass local ordinances which require assessing and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.2 Improve policies/regulations aimed at protecting and preserving critical coastal and marsh habitats and securing mitigation for losses that create an environmental benefit.

100.3.0.5 Develop policies that will promote improved and secure habitat connections between conserved SGCN habitats.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.7 Amend current policies and/or regulations to increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.12 Develop policies that promote the preservation and protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.23 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.31 Create or expand tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMPs.

100.3.0.32 Coordinate regulations across agencies to maximize availability of and enrollment in existing Forestry Stewardship Programs (e.g., "Woodland Stewards", Farm Bill, partners, etc.) to maintain and/or improve forest habitat.

100.3.0.38 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.3.0.39 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.3.0.40 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.45 Increase the controlled burn season to focus on restoring vegetative communities.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.48 Propose new State law or regulation mandating that a State-level "development impact fee" be assessed on all new development approved by municipalities (via the Municipal Land Use Law processes), and dedicate such monies to the development and implementation of regional Habitat Conservation Plans (or existing plans/programs serving the same regional function).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.53 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded rights-of-way corridors associated with energy transport/transmission.

100.3.0.57 Develop regulations that when implemented will improve and secure habitat connections between conserved SGCN habitats.

100.3.0.58 Develop regulations that when implemented will promote the expansion of acreages and enhancement of the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.59 Develop regulations that when implemented will increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.65 Develop regulations that when implemented will protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100.3.2 State Land Acquisition Programs

100.3.2.1 Increase opportunities for habitat restoration by making any necessary policy changes to state, federal and local land acquisition programs (e.g., Green Acres, Blue Acres, etc.) to allow for acquisition within abandoned or failing bay shore communities, including mechanisms to relocate displaced people and infrastructure.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.2 Create a policy that requires the NJ DEP to incorporate scientific information regarding climate change and sea level rise (e.g., predictions, habitat management/acquisition efforts to enhance resilience to inundation) on their websites and to work with other government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

100.4.0.3 Develop policies for mandatory buffer strips on preserved farmlands and state-owned agricultural lands.

100.4.0.8 Develop a white paper addressing the impacts that existing, new or expanded rights-of-way have upon wildlife, wildlife habitats and habitat connectivity.

100.4.0.10 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.4.0.11 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.4.0.12 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.4.0.13 Develop policies for different circumstances (e.g., roadsides and medians, riparian, aquatic and terrestrial habitats) that outline appropriate habitat/vegetation management strategies and schedules to minimize risks to and benefit wildlife.

100.4.0.16 Develop policies to implement habitat management strategies that will increase the structural diversity surrounding areas used for energy, mining, and transportation and service corridors which include but are not limited to the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-

100.4.0.17 Develop policies to implement habitat management strategies, including prescribed burns, that will increase the structural diversity on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies to control and reduce the impacts of invasive, non-native species in order to increase structural habitat diversity.

100.4.0.18 Develop policies to minimize the extent of infrastructure associated with energy and service corridors or areas (e.g., wind and solar farms, pipelines, utility lines) and that require the implementation of habitat management strategies that will increase the structural diversity in the area including (e.g., the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides).

100.4.0.19 Develop regulations that will minimize the creation of new barriers, remove or replace current barriers with appropriately-sized systems to accommodate wildlife dispersal, and to minimize road widening and traffic volume increases within critical wildlife habitat areas.

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Bumble Bees

Focal species that comprise this Conservation Target:

American Bumble Bee
Ashton Cuckoo Bumble Bee
Rusty Patched Bumble Bee
Southern Plains Bumble Bee
Variable Cuckoo Bumble Bee
Yellow Bumble Bee
Yellow-banded Bumble Bee

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:
- 1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.1.1.2 Loss, alteration and/or degradation of habitat.
- 1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:
- 1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.2.1.2 Loss, alteration and/or degradation of habitat.
- 1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats:
- 1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.3.1.2 Loss, alteration and/or degradation of habitat.
- 1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture (Avg. Score: 3.00)

NJ Specific Threats:
- 2.1.1.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.
- 2.1.1.5 Lack of competitive market prices to maintain native grasslands causes conversion to other crops that have more monetary value but less value as wildlife habitat.

2.1.2 Small-holder Farming (Avg. Score: 2.00)

NJ Specific Threats:

2.1.2.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.2.2 Fragments terrestrial and aquatic habitats.

2.1.2.3 Agricultural practices (e.g., mechanized, row-crop agriculture) can render lands unsuitable for most wildlife due to soil degradation and erosion.

2.1.2.4 Agricultural practices (e.g., mechanized, row-crop agriculture) can cause direct mortality to wildlife when harvesting takes places.

2.1.2.5 Lack of competitive market prices to maintain native grasslands causes conversion to other crops that have more monetary value but less value as wildlife habitat.

2.1.3 Agro-industry (Avg. Score: 3.00)

NJ Specific Threats:

2.1.3.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.3.2 Fragments terrestrial and aquatic habitats.

2.1.3.3 Agricultural practices (e.g., mechanized, row-crop agriculture) can render lands unsuitable for most wildlife due to soil degradation and erosion.

2.1.3.5 Loss of ecotones by implementing clean farming (edge-to-edge) practices degrades habitat for early successional wildlife.

2.1.3.6 Lack of competitive market prices to maintain native grasslands causes conversion to other crops that have more monetary value but less value as wildlife habitat.

2.2 Wood and Pulp Plantations

2.2.1 Small Holder (Avg. Score: 1.00)

NJ Specific Threats:

2.2.1.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.2.2 Agro-industry Plantations (Avg. Score: 1.00)

NJ Specific Threats:

2.2.2.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.3 Livestock Farming and Ranching

2.3.2 Small-holder Grazing (Avg. Score: 1.00)

NJ Specific Threats:

2.3.2.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.2.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

2.3.2.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.2.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

2.3.3 Agro-industry Grazing (Avg. Score: 2.00)

NJ Specific Threats:

2.3.3.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.3.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

2.3.3.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.3.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

3 Energy Production and Mining

3.2 Mining and Quarrying

3.2.2 Surface Mining - Rock Quarry (and sand quarries) (Avg. Score: 2.00)

NJ Specific Threats: 3.2.2.1 Fragments terrestrial and aquatic habitats.

3.2.2.2 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

3.3 Renewable Energy

3.3.1 Wind Power (Avg. Score: 2.00)

NJ Specific Threats: 3.3.1.2 Fragments terrestrial habitats.

3.3.1.3 Loss, alteration and/or degradation of habitat.

3.3.2 Solar Power (Avg. Score: 2.00)

NJ Specific Threats: 3.3.2.1 Fragments terrestrial habitats.

3.3.2.2 Loss, alteration and/or degradation of habitat.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats: 4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads (Avg. Score: 1.00)

NJ Specific Threats: 4.2.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species, inhibiting dispersal of non-volant animals, reducing gene flow, and creating barriers to fish when service line-associated roads cross streams (e.g., bridges, culverts, fords, etc.).

4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

4.2.2 Management of rights-of-way or communication tower facilities and/or their associated access roads (Avg. Score: 3.00)

NJ Specific Threats: 4.2.2.1 Improper or poorly scheduled vegetation management can cause direct mortality to and may reduce productivity of wildlife.

5 Biological Resource Use

5.1 Hunting and Collecting Terrestrial Animals

5.1.1 Intentional Use (Avg. Score: 1.00)

NJ Specific Threats: 5.1.1.1 Illegal collection of wildlife can have detrimental impacts on populations.

5.1.3 Persecution/Control (Avg. Score: 3.00)

NJ Specific Threats: 5.1.3.1 Wanton killing of perceived dangerous and/or undesirable animals.

5.2 Gathering Terrestrial Plants

5.2.3 Control (Avg. Score: 3.00)

NJ Specific Threats: 5.2.3.1 Alteration or control of undesirable plants or plant communities can destroy important food and nectar plants for native insects and animals.

5.3 Logging and Wood Harvesting

5.3.2 Intentional Use (large scale) (Avg. Score: 1.00)

NJ Specific Threats:

5.3.2.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.2.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.2.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.2.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.2.6 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices in Atlantic White Cedar stands may destroy a unique wildlife wetland habitat that is difficult, and takes time, to restore.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized) (Avg. Score: 2.00)

NJ Specific Threats:

6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.

6.1.1.3 Increased risk of harassment that results in a change in wildlife behavior and/or direct mortality from vehicle strikes.

6.1.1.6 Off-road vehicles can be a mechanism of transference of wildlife diseases and invasive plant species if gear and apparel are not properly sanitized between sites.

7 Natural Systems Modifications

7.1 Fire and Fire Suppression

7.1.1 Increase in Fire Frequency/Intensity (Avg. Score: 2.00)

NJ Specific Threats:

7.1.1.1 Increase in frequency and intensity of wild fires as a result of droughts and heat waves drying out vegetation and litter.

7.1.1.2 Increase in frequency of wild fires as a result of illegal activities.

7.1.1.3 Unnatural fire regimes occurring as a result of military exercises.

7.1.1.4 Lack of diversity in age structure and composition of vegetation due to expansive, frequent fires.

7.1.2 Suppression of Fire Frequency/Intensity (Avg. Score: 2.00)

NJ Specific Threats:

7.1.2.1 Shift in vegetative communities as a result of suppression of natural fires.

7.1.2.2 Lack of diversity in age structure and composition of vegetation due to the suppression of fire.

7.3 Other Ecosystem Modifications

7.3.2 Inappropriate timing of mowing (Avg. Score: 3.00)

NJ Specific Threats:

7.3.2.1 Increased risk of direct mortality and/or reduced productivity of wildlife, as well as reduced use by migrating species.

7.3.5 Poor habitat management (Avg. Score: 3.00)

NJ Specific Threats:

7.3.5.1 Improper or poorly scheduled maintenance of man-made corridors (e.g., roadsides and medians) can cause direct mortality to and may reduce productivity of wildlife.

7.3.5.2 Shifting from natural vegetation to lawns can cause increased temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

7.3.5.3 Vegetation clearing removes terrestrial and riparian corridors for animal movement, shelter, and resting areas.

7.3.5.4 Vegetation clearing or inappropriate alteration adjacent to aquatic habitats threatens aquatic species by degrading habitat and water quality (altering temperature and dissolved oxygen, increasing siltation and desiccation, etc.).

7.3.5.5 Habitat management that alters or removes vegetation without implementing long-term management increases the risk of invasive and exotic plants establishing themselves, outcompeting native vegetation.

7.3.5.6 Habitat management, including that which occurs on public and private lands, that does not consider timing and species' behaviors can result in the direct mortality and/or alteration or loss of habitat.

7.3.5.7 Improperly planned habitat management and/or mitigation efforts along roadsides and within the medians can attract wildlife and increase the risk of vehicle strikes.

7.3.5.12 Lack of diversity in age structure and composition of vegetation due to lack of natural disturbances and/or vegetation management.

7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

7.3.5.18 Lack of funding or competitive market prices to maintain native grasslands for grassland-dependent species causes conversion of fallow or hay fields to other crops or shrublands.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species (Avg. Score: 2.00)

NJ Specific Threats: 8.1.1.1 Displace or outcompete native species for resources.

8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.

8.1.1.6 Invasive, non-native plants may create physical barriers for some species.

8.1.4 Invasive non-native terrestrial/wetland animals (Avg. Score: 1.00)

NJ Specific Threats: 8.1.4.1 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.6 Invasive non-native fungal/bacterial diseases (Avg. Score: 3.00)

NJ Specific Threats: 8.1.6.1 The introduction of non-native fungal and bacterial diseases threatens native populations and ecosystems.

8.4 Problematic Species/Diseases of Unknown Origin

8.4.1 Unspecified Species (Avg. Score: 2.00)

NJ Specific Threats: 8.4.1.1 Non-native or poorly understood diseases and parasites could potentially impact native animals.

8.4.2 Named Species (Avg. Score: 1.00)

NJ Specific Threats: 8.4.2.1 Honey bee diseases such as Deformed Wing Virus(DWV) and Nosema ceranae have been found to able to be transmitted to wild bumble bees.

8.5 Viral/Prion-induced Diseases

8.5.1 Unspecified Species (Disease) (Avg. Score: 1.00)

NJ Specific Threats: 8.5.1.1 There is a large knowledge gap regarding the existence of, or potential for, other diseases impacting native wildlife.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.3 Agricultural and Forestry Effluents

9.3.2 Soil Erosion and Sedimentation (Avg. Score: 1.00)

NJ Specific Threats: 9.3.2.2 Soil erosion and sedimentation limit the re-establishment of plants needed by terrestrial wildlife as cover and a food base.

9.3.3 Herbicides and Pesticides (Avg. Score: 3.00)

NJ Specific Threats: 9.3.3.1 Pesticides degrade terrestrial and aquatic habitats, especially streams, ponds and wetlands. Aquatic wildlife are particularly sensitive to these contaminants, which can cause developmental and behavioral abnormalities and reproductive failure. Some contaminants may bioaccumulate in predatory fish and birds and disrupt reproduction.

9.3.3.3 Use of pesticides can directly harm non-target species through direct contact and/or by reducing and/or contaminating their food supply.

9.3.3.4 Use of herbicides can destroy beneficial food and nectar plants for insects.

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture (Avg. Score: 3.00)

NJ Specific Threats: 9.3.5.1 Use of pesticides, insecticides, and/or herbicides can directly harm non-target species, such as amphibians and beneficial invertebrates through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5.2 Use of herbicides can destroy beneficial food and nectar plants for insects.

9.3.5.4 Improper use of current insecticides, such as those containing esfenvalerate, prallethrin, or piperonyl butoxide, or past use of pesticides containing chlordane still present in the soils, are toxic to various wildlife species, and can cause injury, mortality, or other effects that impair population viability.

9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.5 Air-Bourne Pollutants

9.5.4 Other (Avg. Score: 1.00)

NJ Specific Threats: 9.5.4.1 Dust and/or airborne sedimentation from construction sites, agricultural operations or related earth disturbances can introduce mineral or organic sediments into adjacent wildlife habitats, degrading their quality and suitability for wildlife short-term and/or long-term.

9.5.6 Herbicides and Pesticides (Avg. Score: 3.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 3.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.6 Phenology Shifting or Alteration

11.6.1 Phenology shifts related to pollination ecology (Avg. Score: 1.00)

NJ Specific Threats: 11.6.1.1 Alters inter-specific relationships of wildlife and vegetation, ultimately leading to detrimental impacts on the ecological system.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 3.00)

NJ Specific Threats: 12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.2 Lack of up-to-date existing information (Avg. Score: 3.00)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.3 Need to answer research question (Avg. Score: 3.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.4 Need to develop new technique (Avg. Score: 3.00)

NJ Specific Threats: 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 1.00)

NJ Specific Threats: 12.3.0.1 Regulatory habitat protections within state land use regulations are spatially limited to specific geographic areas (e.g., Pinelands, Coastal Area) or geographic features (e.g., wetlands, streams) and so fail to protect critical habitats that exist outside of these regulated areas.

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.9 Prescribed burns implemented by the NJ Forest Fire Service are constrained by State air quality regulations to a timeframe where seasonal weather conditions are less than ideal for effective burning. As a result, the Forest Fire Service is limited in the number of overall prescribed burns it can implement to restore habitat for wildlife.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 1.00)

NJ Specific Threats: 12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.

12.4.0.5 Bureau of Forest Fire Management policy has traditionally implemented prescribed burns on State lands for the sole purpose of public safety (i.e., addressing hazard fuel reduction), missing opportunities to burn in a manner that would additionally manage habitat for ecological diversity.

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 3.00)

NJ Specific Threats:

14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 3.00)

NJ Specific Threats:

14.2.1.1 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various forest management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 1.00)

NJ Specific Threats:

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.5 Secure and promote the protection/restoration of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through incentive programs.

1.2.1.6 Secure and promote the protection/restoration of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.9 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing Forestry Stewardship Programs.

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.12 Create incentives (non-monetary and/or monetary) for land developers to redevelop abandoned areas (e.g., shopping centers, office complexes) to minimize the loss of natural habitats and reduce the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.14 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of herbicides and pesticides, and implementing more ecologically safe strategies when using such products.

1.2.1.15 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of rodenticides, and implementing more ecologically safe strategies when using such products.

1.2.1.16 Create incentives (non-monetary and/or monetary) within State regulations (mitigations requirements or credit, BMP satisfaction, etc.) to promote the use of retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.17 Develop a public-relations oriented certification program for private retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.18 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and land managers to control and reduce the impacts of invasive, native and non-native species in order to increase structural habitat diversity.

1.2.1.19 Create incentives for federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to farmers, woodland landowners, and private landowners to adopt and/or endorse consistent BMPs concerning controlled burns to maintain and/or improve wildlife habitat.

1.2.1.20 Coordinate across government agencies and non-government organizations to create or expand upon tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMP's.

1.2.1.21 Create and/or support market-based programs that subsidize or create branding for products derived sustainably from managed wildlife habitats.

1.2.1.22 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to horse/livestock farm owners and managers to increase structural habitat diversity in and around the farms by managing vegetation for a variety of species, in particular, farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

1.2.1.23 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to provide cost shares and/or plan approvals for management based on management approaches and prescriptions.

1.2.1.24 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners, with habitat of suitable patch size to support breeding grassland-dependent species, to alter the timing of vegetation management to benefit grassland and pollinator species.

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

1.2.1.28 Create incentives to implement dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

2 Direct Management of Natural Resources

2.3 Fire management

2.3.2 Fuel reduction

2.3.2.1 Prevent wildfires by reducing natural fuel (e.g., leaf litter).

2.3.3 Prescribed burning

2.3.3.1 Evaluate different management techniques of prescribed burns that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

2.3.3.2 Conduct prescribed burning in Northern New Jersey forests to maintain and regenerate a mosaic of upland forest habitats.

2.3.3.3 Conduct prescribed burning to improve wildlife habitat.

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.1 Control invasive insect infestations by implementing BMP strategies through biological, chemical and/or mechanical means that will depress, or when appropriate, eradicate populations in a manner that avoids excessive harm to non-target species using BMPs to control infestations and limit their spread based on an inventory of invasive insect distribution and response to outbreaks.

2.8.0.2 Develop, implement, monitor and evaluate pest control/management strategies to reduce the impacts of over-abundant wildlife species (native and/or native, invasive species) on native vegetation and the degradation of habitats supporting SGCN. Over-abundant wildlife species include but are not limited to mute swans, Canada geese, beaver and white-tailed deer.

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.5 Implement biologically safe and appropriate control/management strategies, and where appropriate, eradication strategies to reduce the impacts and/or limit the distribution of invasive and/or non-native plant species within or near aquatic systems using methods that will provide the most protection to the aquatic and riparian ecological system, and minimize disturbance to the soil and wildlife. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.8.0.6 Implement long-term management of invasive and/or non-native plants to help maintain functioning ecological systems and biological diversity, and to enhance travel corridors. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.2 Improve the availability of prey/food resources through terrestrial and aquatic plantings and habitat restoration for SGCN populations, in particular for those populations thought to be limited due wholly or in part to a lack of (or contaminated) food resources, and for migratory species (birds, bats, invertebrates).

2.10.0.3 Restore and/or enhance habitats to benefit urban-associated SGCN.

2.10.0.4 Restore and/or enhance suitable travel corridors connecting conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.8 Protect significant natural and/or unique communities by implementing best management practices when conducting habitat restoration strategies.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.10 Minimize the loss of important habitats (e.g., coastal scrub-shrub and grassy habitats, high and low marsh habitats, etc.) that provide nesting, migrating, and wintering areas for SGCN birds and other coastal and marsh-dependent species through habitat restoration efforts.

2.10.0.11 Restore and/or enhance critical migratory terrestrial and aquatic habitats (e.g., beach, grasslands, forest, scrub-shrub, etc.) for songbirds, raptors, shorebirds, waterfowl, bats and invertebrates through habitat restoration efforts and expand habitat restoration to adjacent private lands to increase the effective size of the habitat.

2.10.0.12 Create and/or maintain scrub-shrub habitats through revegetation efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.15 Restore and/or enhance terrestrial and aquatic habitats proximate to but not adjacent to roads and other transportation corridors for terrestrial-bound SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.10.0.21 Restore and/or enhance understory habitats that suppress invasive species and provide critical resources and enhance sheltering, foraging, and nesting cover for wildlife.

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.11.0.3 Create suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats through vegetation management.

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through vegetation management.

2.11.0.6 Reclaim degraded rare species habitats by conducting vegetation management needed to restore habitat value for the documented/target SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.23 Implement appropriate habitat management actions in areas where natural disturbances, such as wildfire, have been precluded.

2.11.0.24 Conduct vegetation management adjacent to aquatic habitats following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.25 Conduct vegetation management along access roads following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.26 Conduct vegetation management along roadsides and medians, avoiding peak activity periods for wildlife, that enhances wildlife dispersal naturally and safely across roads and similar barriers to/between terrestrial and/or aquatic habitats.

2.11.0.27 Conduct vegetation management for target shrub- or young forest-dependent SGCN following BMPs to minimize the risk of the establishment of invasive and non-native plants.

2.11.0.28 Conduct vegetation management in agricultural areas following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.29 Conduct vegetation management on transportation and service corridors (i.e., rights-of-way) following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.30 Identify and prioritize areas where various management tools (such as increasing salinity through the management of water levels or chemical applications) may be effective in reducing phragmites within and restoring marsh habitat.

2.11.0.31 In areas where vegetative communities are shifting due to fire suppression and controlled burns are not feasible, manage vegetation to improve wildlife habitat.

2.11.0.32 Increase structural habitat diversity around and when feasible, within agricultural landscapes by managing vegetation for a variety of species, in particular, those farms that have removed scrub-shrub habitat and/or fragmented forests, and by implementing ecologically best practices (e.g., no-till farming, maintaining hedgerows, buffer set-asides, etc.).

2.11.0.33 Increase structural habitat diversity by implementing long-term vegetation management to minimize the potential for the establishment of invasive and/or non-native plants that may outcompete native vegetation.

2.11.0.34 Increase structural habitat diversity by managing residential, commercial and recreational areas' landscapes for a variety of species. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.

2.11.0.38 Increase structural habitat diversity in and around horse/livestock farms by managing vegetation for a variety of species, in particular, in and around farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

2.11.0.39 Increase structural habitat diversity in and around solar farms by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.40 Increase structural habitat diversity surrounding areas used for energy, mining, and transportation and service corridors by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides, and avoid managing habitat during the breeding seasons for ground-nesting birds, reptiles, amphibians and small mammals.

2.11.0.41 Increase structural habitat diversity through the implementation of a variety of vegetation management practices such a prescribed burns (either increasing or decreasing their frequency depending on the site and objective), plantings, etc. that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.42 Increase structural habitat diversity within wind farms for terrestrial bound and low-flying species and around wind farms for other wildlife by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.43 Manage forests to increase variation in age structure and composition using BMPs that promote and maintain functioning ecological forest-based systems and biological diversity.

2.11.0.45 Regularly and/or rotationally create young forest habitat in targeted areas to maintain and regenerate a mosaic of upland forest habitats that will benefit shrub- and young forest-dependent species.

2.14 Wildlife disease management

2.14.0 Wildlife disease strategy development and investigation

2.14.0.1 Investigate diseases/pathogens impacting SGCN and/or their habitats.

2.14.0.2 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

2.14.0.3 Protect SGCN from exotic pathogen introduction or incident through implementation of a "rapid response plan"; DFW to give priority attention to these species in planning and/or implementing a response.

2.14.0.4 Conduct long-term monitoring of diseases in vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts.

2.14.0.5 Assess the impacts of diseases on the life cycles of wildlife.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.6 Conduct long-term studies on resident and migratory SGCN to determine if there are changes to the populations' demography (productivity, survival, dispersal) and/or to their critical and/or supporting habitats (i.e., diminishing in value, acreage or connectivity, etc.), in particular changes that would not maintain SGCN at viable levels for species populations. Update data and GIS maps; provide updated information to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.12 Compile available life history information on urban-associated SGCN (e.g., predators, levels of nest/young depredation, breeding longevity and reproductive effort over time, preferred nesting/reproductive requirements, fidelity to breeding and wintering sites, comprehensive assessment of migration routes and destinations) for future development of management strategies to benefit such species.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.14 Identify areas with invasive, aquatic plants and animals and collect a detailed baseline assessment of the species' status and distribution. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort. Researchers and contractors performing Forest Stewardship Inventories and/or Plans on state lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.0.0.15 Conduct long-term monitoring of areas identified as having invasive, aquatic plants and animals to track the species' status/progress over time with or without the implementation of management strategies. Areas without management strategies should be assessed and prioritized for management/control. Areas where management strategies are being implemented should include an assessment of the management effort and identify/recommend and implement necessary changes to improve its success. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort.

3.0.0.26 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species including objectives and guidance pertaining to and the condition/status of critical and supporting habitats.

3.0.0.27 Evaluate the effectiveness of strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals through research and monitoring. Develop and provide NJ DEP and other appropriate governing agencies/commissions a summary of findings and recommendations to improve such efforts.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.7 Track (via a database that includes a GIS component) and research problematic species and diseases to determine their distribution, impacts on SGCN wildlife/wildlife communities, and develop potential control measures.

3.2.0.8 Implement and conduct long-term monitoring of control measures aimed at minimizing the impacts of problematic species and/or diseases to evaluate the effectiveness of such efforts and to identify and incorporate additional strategies as appropriate.

3.2.0.18 Conduct baseline surveys/inventories to better understand the distribution of fish and invertebrate (including freshwater mussels) populations.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.2 Age, size and sex structure

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.3 Baseline inventory

3.2.3.9 Investigate hazardous environmental issues that may impact grassland invertebrates.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.6 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) that could, through revegetation and/or enhancement efforts, become suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN.

3.3.1.7 Map and prioritize existing and potential areas for early succession forest management. Share the results with state, county and municipal planners.

3.3.1.8 Assess the availability and suitability of forest habitats for SGCN species (particularly reptiles and amphibians, birds, pollinators, and tiger beetles) in southern forests since Superstorm Sandy.

3.3.1.9 Inventory forests throughout northern New Jersey to develop a baseline characterization of the structure and composition of habitats and identify deficient forest habitat types.

3.3.1.10 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and document fish SGCN habitats by plotting their distributions in GIS and submitting the data to the State for integration into the DEP's Biotics database.

3.3.1.16 Gather "best information" for spatial modeling and update/create a current model/depiction of anticipated habitat shifts from sea-level rise, flooding, etc.

3.3.1.17 Identify and map undeveloped roads and trails in all conserved forests, and create a database of locations. Integrate information regarding potentially sensitive areas.

3.3.1.18 Conduct an assessment using available data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels.

3.3.1.19 Identify and codify legal ORV access areas on state (and if appropriate, other conserved) lands. Provide GIS mapping to the landowner for potential use in directing such recreational activities.

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.2 Monitoring

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.8 Evaluate the effectiveness of current prescribed burning practices on Pinelands dependent species.

3.3.2.10 Evaluate the efficacy and success of different management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.3.2.11 Evaluate and compare the effectiveness of delayed mowing of warm season grass fields versus cool season hay fields to benefit grassland-dependent species.

3.3.2.12 Evaluate and compare the effectiveness of different management techniques (e.g., prescribed burning, mowing, brush-hogging, etc.) for maintaining suitable habitat for grassland-dependent species and species dependent upon early successional habitats.

3.3.2.13 Evaluate the effectiveness of management strategies (e.g., timing restrictions for mowing, cooperative agreements with utility companies for maintenance of rights-of-ways) that maintain and enhance large existing areas of grassland in perpetuity. Focus on habitat patches that can be managed to enhance the total size of suitable grassland habitat and create interspersed early-successional habitat.

3.3.2.15 Investigate the effectiveness of management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.3.2.20 Once a system is developed for reporting and qualifying new locations of invasive species, develop, implement and monitor/evaluate invasive species removal strategies at identified locations. Priority should be given to those areas critical to SGCN and/or contain unique and/or rare plant communities supporting SGCN and/or other fish/wildlife species.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.3 Develop/improve management techniques that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.9 Develop strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.3.16 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.3.19 Work with foresters to develop prescribed burning practices for Pinelands dependent species that increase or maintain habitat quality for these species in the Pinelands.

3.5.3.21 Develop management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.22 Identify (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) and modify management strategies (e.g., timing restrictions for mowing, cooperative agreements with utility companies for maintenance of rights-of-ways), based on research, that maintain and enhance large existing areas of grassland in perpetuity.

3.5.3.24 Based on research, modify management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.3.29 Explore the use of alternative vegetation (i.e., commodity crops) to address agriculture concerns.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.5 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

3.5.4.6 Investigate the feasibility of mitigating for the impacts of contaminants to vulnerable wildlife, particularly SGCN. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.5.4.14 Develop and implement agreements, and update existing agreements, with government agencies regarding the protection of critical SGCN habitats (e.g., significant breeding populations of beach nesting birds, colonial waterbird nesting areas, bat colonies, etc.).

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.18 Investigate the effectiveness of survey techniques through selected “ground truthing” and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

3.5.4.21 Develop BMPs to address problematic species and diseases of unknown origin.

4 Education

4.1 Educator/Instructor training

4.1.0 Public education

4.1.0.1 Provide educational resources and training programs to private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

5 Facilities and Areas

5.15 Wildlife Management Areas

5.15.6 Roads

5.15.6.1 Clearly post areas/roads where vehicle access is permitted.

5.15.6.2 Clearly post areas/trails where vehicle access is not permitted.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.7 Secure and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.8 Secure and protect scrub-shrub habitats for SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.8 Promote the protection of scrub-shrub habitats for SGCN through conservation area designations.

6.4 Private lands agreements

6.4.0 Private land agreement strategies

6.4.0.1 Enter into private lands agreements to expand control burns on private lands, in particular those adjacent to conserved lands to improve SGCN habitats.

7 Law Enforcement

7.1 Law enforcement

7.1.3 Sub-national Level

7.1.3.2 Increase the number of law enforcement officers tending to wildlife issues to a reasonable number to sufficiently cover the State and marine waters.

7.1.4 Scale Unspecified

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.19 Implement policies that protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

7.1.4.26 Educate law enforcement personnel that there may be unauthorized research projects taking place and to encourage them to investigate any activities that appear to be harmful to wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.2 Develop a team of personnel from government entities, conservation organizations and other stakeholders engaged in oil/gas spill response for marine and freshwater habitats to develop a feasible plan for oil spill response and/or to amend NJ's current oil spill response plan that clearly outlines each organizations responsibilities and an assessment and location list of available equipment for boom deployment during oil spills.

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.1.0.4 Engage government agencies, conservation partners and other stakeholders in constructive dialogues encouraging them to influence policy change and the creation of incentives through a habitat bill and/or municipal ordinances for backyard habitat.

8.1.0.15 Engage government agencies, conservation partners and other stakeholders in discussions encouraging and supporting the creation of laws and policies requiring vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

8.1.0.16 Engage local governments in discussions regarding the importance of them adopting/passing ordinances which require assessing and addressing secondary impacts (i.e., ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

8.1.0.17 Engage municipalities in constructive dialogue to identify and minimize destruction of areas prioritized for early succession forest management.

8.1.0.18 Engage NJDOT, NJ Transit Authority and other road management entities, wildlife conservation organizations/agencies (e.g., Division of Fish and Wildlife, New Jersey Conservation Foundation, Conserve Wildlife Foundation of NJ), and communities and citizens in discussions regarding the importance of and methods to enhance habitat connectivity, and work together to develop feasible strategies for ensuring that wildlife can disperse naturally and safely across roads and similar barriers to terrestrial and/or aquatic habitats.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.20 Organize a small focal group of government and non-government agencies/organizations responsible for decisions regarding beach/dune management to share and coordinate their goals so that comprehensive planning can attempt to meet all needs.

8.1.0.21 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation human-subsidized and/or overabundant, native species cause to local nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.22 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation invasive species cause to native nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.26 Coordinate across federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to woodland landowners to adopt or endorse consistent best management practices concerning controlled burns to maintain and/or improve forested habitat for wildlife.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.34 Work with the NJ Education Association and Department of Education to design curriculum and outdoor experimental learning opportunities, and provide training to teachers on implementation of these activities.

8.1.0.37 Enlist landowners and NJ citizens in the protection of and survey efforts for SGCN, in particular rare species, by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management and wildlife-related volunteer programs.

8.1.0.38 Engage partners, stakeholders and land managers in constructive dialogue promoting forest stewardship for SGCN that use core forests and forested corridors.

8.1.0.40 Encourage researchers, land managers, naturalists and enthusiasts to follow proper procedures for the coordination and/or permitting of research/management activities involving wildlife and sensitive habitats, and discourage activities that alter vegetation or wetlands, or cause harm or disturbance to wildlife.

8.1.0.42 Engage citizens, wildlife observers and photographers through discussions and distributable information regarding the importance of and encouraging implementing responsible and ethical behavior when observing wildlife by developing an alliance of wildlife photographers and widely circulating recommendations on how to reduce impact.

8.1.0.44 Engage conservation partners, stakeholders, government agencies and other land stewards in constructive dialogues encouraging their inclusion of controlled burns in forest and other stewardship plans.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.1.0.48 Form cooperative partnerships with transportation and shipment agencies and companies to facilitate habitat creation and enhancement away from and outside of project areas and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.2 Recruitment and retention activities

8.2.3 For wildlife watching

8.2.3.1 Develop and implement nature-focused tourism opportunities including wildlife viewing sites, interpretive signage highlighting unique ecosystems/habitats, and wildlife-related recreational opportunities that do not negatively impact SGCN or their habitats.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.7 Develop and provide (or otherwise make publicly available) educational programs and/or materials that describe the negative impacts of off-road vehicles and watercraft use in and adjacent to critical SGCN habitats, and the importance of confining such activities to more appropriate locations and/or seasons.

8.3.0.8 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate recreationists and encourage landowners to eliminate garbage in the vicinity of suitable wildlife habitat, in particular SGCN habitat. Information should include the detrimental impacts garbage may have on various wildlife species.

8.3.0.9 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners and land managers to include only native plants in landscaping and restoration projects. Provide information to assist them in detecting problematic establishment of invasive, non-indigenous plants.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.11 Develop and provide (or otherwise make publicly available) educational programs and/or materials to the public, wildlife-related professionals, foresters, etc., that describe the value of species that are often feared (e.g., snakes, bats, spiders, Allegheny woodrat) and/or deemed a "nuisance" (e.g., squirrel, deer, snapping turtle), and therefore, persecuted by people. Include information on tolerance, proper identification, eviction from human dwellings, how to minimize the animal's presence on the property, and/or how to live in harmony with the animal.

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.24 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

8.3.0.25 Develop educational outreach programs for landowners, nurseries and the general public regarding the negative impacts of invasive and non-native plants on our natural communities.

8.3.0.26 Develop educational outreach programs for private and public landowners and land managers regarding the importance of and how to manage core forests and forested corridors in a way that will be beneficial for SGCN, particularly endangered, threatened and special concern species.

8.3.0.27 Develop educational outreach programs for public and private landowners and land managers regarding the importance of structural habitat diversity, methods to increase diversity, and/or incentive programs available to increase habitat diversity.

8.3.0.28 Develop educational outreach programs for public and private landowners and land managers regarding the importance of managing grasslands for grassland-dependent species, methods of management, and/or incentive programs available.

8.3.0.30 Develop educational outreach programs for private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.5 Develop a plan that directs the creation or expansion of energy or utility rights-of-way in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.6 Develop a plan that directs the creation or expansion of roads and railroads or the re-establishment of abandoned railroads within and adjacent to critical forested habitats in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.8 Develop a plan that focuses on strategies for oil pipelines to avoid sensitive habitats that would be highly impacted by oil spills.

9.1.0.9 Develop a plan that focuses on strategies to minimize the creation of renewable energy farms (e.g., solar, wind) and related infrastructures within and their impacts on forested habitats and the wildlife community.

9.1.0.10 Develop a plan that focuses on strategies to minimize the impacts of mining on critical forested habitats.

9.1.0.11 Develop a plan that focuses on strategies to minimize the impacts of power plants on critical forested habitats and the wildlife community.

9.1.0.13 Develop a plan to minimize agriculture that would result in groundwater withdrawal in critical forested areas.

9.1.0.15 Develop a plan to minimize fragmentation of terrestrial and aquatic habitats by roads.

9.1.0.16 Develop a plan to minimize new lawnscapes and preserve natural vegetation within and adjacent to critical forest areas.

9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.2 Organizational strategic and CMS planning

9.2.1 Organizational strategic and operational planning

9.2.1.1 Identify and codify legal ORV access areas on state lands.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.5 Develop response plans to address disease outbreaks within wildlife populations, in particular SGCN.

9.3.1.7 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.10 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.15 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.1.16 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.1.20 Use compiled life history information on urban-associated SGCN regarding threats, breeding, fecundity, survival, habitat needs, wintering sites/roosts, migration routes and destinations, etc. to develop wildlife management strategies to benefit such species.

9.3.3 Habitat management planning

9.3.3.5 Develop a management plan using forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

9.3.3.7 Develop a management plan to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

9.3.3.8 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.3.13 Develop a management plan that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas and prevents or ameliorates near-term impacts of climate change throughout the State, but in particular within the coastal and Delaware Bay areas.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.16 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.3.17 Develop a management plan for prescribed burning that will benefit Pinelands dependent species and increase or maintain habitat quality for these species in the Pinelands.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.21 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.3.26 Develop a management plan for parcels of suitable size to be managed for native herbaceous plant species that support breeding grassland dependent species.

9.3.3.28 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.3.29 Develop habitat management plans aimed at reducing or eliminating negative impacts of ORVs.

9.3.3.32 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3.34 Include controlled burn prescriptions in forest and stewardship plans to improve wildlife habitat.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

9.3.3.38 Use compiled life history information on urban-associated SGCN regarding threats, breeding, fecundity, survival, habitat needs, wintering sites/roosts, migration routes and destinations, etc. to develop habitat management strategies to benefit such species.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.12 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed solar farm projects to reduce habitat fragmentation and minimize impacts on wildlife.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.2 Provide technical support to public and private landowners and land managers for controlling invasive, native and non-native plant species in order to increase structural habitat diversity.

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.7 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on the importance of maintaining habitat connectivity, minimizing fragmentation, and the use of CHANJ products to help them target areas for such planning.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.11 Provide educational resources, training programs, and on-the-ground guidance to private and public landowners and land managers on the benefits of and for creating young forest and early succession habitat for SGCN.

11.2.0.12 Provide educational resources and technical support to public landowners and land managers for managing grasslands for grassland-dependent species.

11.2.0.15 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and landowners about the importance of retaining and in an effort to protect, create, enhance and/or restore vegetation along aquatic habitats.

11.2.0.17 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of vernal pools and the protection, enhancement and/or restoration of biologically appropriate buffers.

11.2.0.19 Provide educational resources and technical support to public and private landowners and land managers to promote the protection and/or enhancement of scrub-shrub habitats for SGCN.

11.2.0.22 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

11.2.0.23 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to SGCN habitats to promote the protection and/or enhancement of those adjacent habitats to increase the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and that connect conserved SGCN habitats.

11.2.0.24 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers on how to manage vegetated roadside areas (e.g., mowing, brush-hogging, etc.) on a schedule that avoids peak activity periods for wildlife and therefore, minimizes harm.

11.2.0.25 Provide educational resources, training programs, and on-the-ground guidance to resource managers regarding the assessment of and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) related to residential and commercial development.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.1 Engage partners and stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.3 Provide educational resources, training programs, and on-the-ground guidance to DOD to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop and implement forest management and other practices that minimize disturbances to SGCN (i.e., beyond their federal requirements).

11.2.1.5 Provide educational resources, training programs, and on-the-ground guidance to municipalities, state and federal agency resource managers on tasks such as writing and integrating Beach Management Plans into other management documents.

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

11.2.2 With private landowners

11.2.2.1 Provide technical support to farming operations and woodland landowners on ways to decrease clean farming (edge-to-edge) practices and create ecotones to benefit bobwhite and other species dependent on early successional habitat.

100 Law and Policy

100. Legislation

100.1.2 National Level

100.1.2.1 Create legislation to establish markets for warm-season grasses to increase the permanency of this crop on the landscape.

100.1.3 Sub-national Level

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.4 County and Local

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.3 Expand the acreages and enhance the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN through local ordinances.

100.1.4.12 Secure scrub-shrub habitats for SGCN through local ordinances.

100.1.4.14 Adopt/pass local ordinances which require assessing and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100.1.5.5 Develop legislation to provide financial support for the New Jersey Invasive Species Strike Team.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.5 Develop policies that will promote improved and secure habitat connections between conserved SGCN habitats.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.12 Develop policies that promote the preservation and protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.15 Develop policies that promote protecting and restoring scrub-shrub habitats to benefit shrub-dependent SGCN.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.23 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.24 Create legislation to establish markets for warm-season grasses to increase the permanency of this crop on the landscape.

100.3.0.31 Create or expand tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMPs.

100.3.0.32 Coordinate regulations across agencies to maximize availability of and enrollment in existing Forestry Stewardship Programs (e.g., "Woodland Stewards", Farm Bill, partners, etc.) to maintain and/or improve forest habitat.

100.3.0.38 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.3.0.39 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.3.0.40 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.45 Increase the controlled burn season to focus on restoring vegetative communities.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.48 Propose new State law or regulation mandating that a State-level "development impact fee" be assessed on all new development approved by municipalities (via the Municipal Land Use Law processes), and dedicate such monies to the development and implementation of regional Habitat Conservation Plans (or existing plans/programs serving the same regional function).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.53 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded rights-of-way corridors associated with energy transport/transmission.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.65 Develop regulations that when implemented will protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100.3.0.73 Develop regulations that would exempt the conversion of lawns to native vegetation (beneficial to wildlife) from local lawn ordinances.

100.3.2 State Land Acquisition Programs

100.3.2.1 Increase opportunities for habitat restoration by making any necessary policy changes to state, federal and local land acquisition programs (e.g., Green Acres, Blue Acres, etc.) to allow for acquisition within abandoned or failing bay shore communities, including mechanisms to relocate displaced people and infrastructure.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.2 Create a policy that requires the NJ DEP to incorporate scientific information regarding climate change and sea level rise (e.g., predictions, habitat management/acquisition efforts to enhance resilience to inundation) on their websites and to work with other government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

100.4.0.3 Develop policies for mandatory buffer strips on preserved farmlands and state-owned agricultural lands.

100.4.0.8 Develop a white paper addressing the impacts that existing, new or expanded rights-of-way have upon wildlife, wildlife habitats and habitat connectivity.

100.4.0.10 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.4.0.11 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.4.0.12 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.4.0.13 Develop policies for different circumstances (e.g., roadsides and medians, riparian, aquatic and terrestrial habitats) that outline appropriate habitat/vegetation management strategies and schedules to minimize risks to and benefit wildlife.

100.4.0.14 Develop policies to facilitate agreements between eligible entities to manage appropriate conserved lands for grassland-dependent species, and to have access to/obtain restoration funds.

100.4.0.16 Develop policies to implement habitat management strategies that will increase the structural diversity surrounding areas used for energy, mining, and transportation and service corridors which include but are not limited to the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-

100.4.0.17 Develop policies to implement habitat management strategies, including prescribed burns, that will increase the structural diversity on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies to control and reduce the impacts of invasive, non-native species in order to increase structural habitat diversity.

100.4.0.18 Develop policies to minimize the extent of infrastructure associated with energy and service corridors or areas (e.g., wind and solar farms, pipelines, utility lines) and that require the implementation of habitat management strategies that will increase the structural diversity in the area including (e.g., the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides).

100.4.0.19 Develop regulations that will minimize the creation of new barriers, remove or replace current barriers with appropriately-sized systems to accommodate wildlife dispersal, and to minimize road widening and traffic volume increases within critical wildlife habitat areas.

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.24 Develop policies to provide financial support for the New Jersey Invasive Species Strike Team.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Dotted Skipper

Focal species that comprise this Conservation Target:

Dotted Skipper

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:
- 1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.1.1.2 Loss, alteration and/or degradation of habitat.
- 1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:
- 1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.2.1.2 Loss, alteration and/or degradation of habitat.
- 1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:
- 1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.3.1.2 Loss, alteration and/or degradation of habitat.
- 1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture (Avg. Score: 3.00)

NJ Specific Threats:
- 2.1.1.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.
- 2.1.1.5 Lack of competitive market prices to maintain native grasslands causes conversion to other crops that have more monetary value but less value as wildlife habitat.

2.1.2 Small-holder Farming (Avg. Score: 1.00)

NJ Specific Threats:
- 2.1.2.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.
- 2.1.2.2 Fragments terrestrial and aquatic habitats.

2.1.2.4 Agricultural practices (e.g., mechanized, row-crop agriculture) can cause direct mortality to wildlife when harvesting takes places.

2.1.2.5 Lack of competitive market prices to maintain native grasslands causes conversion to other crops that have more monetary value but less value as wildlife habitat.

2.1.3 Agro-industry (Avg. Score: 3.00)

NJ Specific Threats:

2.1.3.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.3.2 Fragments terrestrial and aquatic habitats.

2.1.3.5 Loss of ecotones by implementing clean farming (edge-to-edge) practices degrades habitat for early successional wildlife.

2.1.3.6 Lack of competitive market prices to maintain native grasslands causes conversion to other crops that have more monetary value but less value as wildlife habitat.

2.2 Wood and Pulp Plantations

2.2.1 Small Holder (Avg. Score: 1.00)

NJ Specific Threats:

2.2.1.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.2.2 Agro-industry Plantations (Avg. Score: 1.00)

NJ Specific Threats:

2.2.2.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.3 Livestock Farming and Ranching

2.3.2 Small-holder Grazing (Avg. Score: 1.00)

NJ Specific Threats:

2.3.2.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.2.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

2.3.2.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.2.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

2.3.3 Agro-industry Grazing (Avg. Score: 3.00)

NJ Specific Threats:

2.3.3.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.3.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

2.3.3.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.3.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

3 Energy Production and Mining

3.2 Mining and Quarrying

3.2.2 Surface Mining - Rock Quarry (and sand quarries) (Avg. Score: 1.00)

NJ Specific Threats:

3.2.2.1 Fragments terrestrial and aquatic habitats.

3.2.2.2 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

3.3 Renewable Energy

3.3.2 Solar Power (Avg. Score: 1.00)

NJ Specific Threats:

3.3.2.2 Loss, alteration and/or degradation of habitat.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.1.1.3 Re-establishment of abandoned railroad lines may displace wildlife, in particular, less mobile species using the area to fulfill critical life history requirements.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads (Avg. Score: 1.00)

NJ Specific Threats: 4.2.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species, inhibiting dispersal of non-volant animals, reducing gene flow, and creating barriers to fish when service line-associated roads cross streams (e.g., bridges, culverts, fords, etc.).

4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

4.2.2 Management of rights-of-way or communication tower facilities and/or their associated access roads (Avg. Score: 3.00)

NJ Specific Threats: 4.2.2.1 Improper or poorly scheduled vegetation management can cause direct mortality to and may reduce productivity of wildlife.

5 Biological Resource Use

5.1 Hunting and Collecting Terrestrial Animals

5.1.1 Intentional Use (Avg. Score: 1.00)

NJ Specific Threats: 5.1.1.1 Illegal collection of wildlife can have detrimental impacts on populations.

5.2 Gathering Terrestrial Plants

5.2.3 Control (Avg. Score: 2.00)

NJ Specific Threats: 5.2.3.1 Alteration or control of undesirable plants or plant communities can destroy important food and nectar plants for native insects and animals.

5.3 Logging and Wood Harvesting

5.3.1 Intentional Use (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.1.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.1.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.1.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.1.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.1.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.1.6 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices in Atlantic White Cedar stands may destroy a unique wildlife wetland habitat that is difficult, and takes time, to restore.

5.3.2 Intentional Use (large scale) (Avg. Score: 1.00)

NJ Specific Threats:

5.3.2.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.2.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.2.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.2.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.2.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.2.6 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices in Atlantic White Cedar stands may destroy a unique wildlife wetland habitat that is difficult, and takes time, to restore.

5.3.3 Unintentional effects (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats:

5.3.3.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4 Unintentional effects (large scale) (Avg. Score: 1.00)

NJ Specific Threats:

5.3.4.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4.5 Lack of appropriate, sustainable forest management can lead to a decrease in forest habitat diversity, degraded habitat for many forest species, the loss of habitat for early-successional species, and/or the loss of unique habitats for species that need canopy breaks and multi-aged tree composition to fulfill various life history requirements.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized) (Avg. Score: 3.00)

NJ Specific Threats:

6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.

6.1.1.3 Increased risk of harassment that results in a change in wildlife behavior and/or direct mortality from vehicle strikes.

6.1.1.6 Off-road vehicles can be a mechanism of transference of wildlife diseases and invasive plant species if gear and apparel are not properly sanitized between sites.

7 Natural Systems Modifications

7.1 Fire and Fire Suppression

7.1.1 Increase in Fire Frequency/Intensity (Avg. Score: 3.00)

NJ Specific Threats:

7.1.1.1 Increase in frequency and intensity of wild fires as a result of droughts and heat waves drying out vegetation and litter.

7.1.1.2 Increase in frequency of wild fires as a result of illegal activities.

7.1.1.3 Unnatural fire regimes occurring as a result of military exercises.

7.1.1.4 Lack of diversity in age structure and composition of vegetation due to expansive, frequent fires.

7.1.2 Suppression of Fire Frequency/Intensity (Avg. Score: 3.00)

NJ Specific Threats: 7.1.2.1 Shift in vegetative communities as a result of suppression of natural fires.

7.1.2.2 Lack of diversity in age structure and composition of vegetation due to the suppression of fire.

7.3 Other Ecosystem Modifications

7.3.2 Inappropriate timing of mowing (Avg. Score: 3.00)

NJ Specific Threats: 7.3.2.1 Increased risk of direct mortality and/or reduced productivity of wildlife, as well as reduced use by migrating species.

7.3.4 Lack of natural disturbance patterns or ecosystem functions due to species loss (Avg. Score: 3.00)

NJ Specific Threats: 7.3.4.5 The lack of forest disturbance minimizes the diversity of herbaceous vegetation and other shrubs and trees that need a lot of sunlight to grow.

7.3.5 Poor habitat management (Avg. Score: 3.00)

NJ Specific Threats: 7.3.5.1 Improper or poorly scheduled maintenance of man-made corridors (e.g., roadsides and medians) can cause direct mortality to and may reduce productivity of wildlife.

7.3.5.3 Vegetation clearing removes terrestrial and riparian corridors for animal movement, shelter, and resting areas.

7.3.5.5 Habitat management that alters or removes vegetation without implementing long-term management increases the risk of invasive and exotic plants establishing themselves, outcompeting native vegetation.

7.3.5.6 Habitat management, including that which occurs on public and private lands, that does not consider timing and species' behaviors can result in the direct mortality and/or alteration or loss of habitat.

7.3.5.7 Improperly planned habitat management and/or mitigation efforts along roadsides and within the medians can attract wildlife and increase the risk of vehicle strikes.

7.3.5.12 Lack of diversity in age structure and composition of vegetation due to lack of natural disturbances and/or vegetation management.

7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

7.3.5.18 Lack of funding or competitive market prices to maintain native grasslands for grassland-dependent species causes conversion of fallow or hay fields to other crops or shrublands.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.1.1.1 Displace or outcompete native species for resources.

8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.

8.1.1.3 Invasive, non-native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

8.1.1.4 Invasive, non-native animals increase the risk of predation on native animals and/or herbivory on native vegetation.

8.1.1.5 Invasive, non-native animals and plants increase the risk of introduction and transference of diseases

8.1.1.6 Invasive, non-native plants may create physical barriers for some species.

8.1.4 Invasive non-native terrestrial/wetland animals (Avg. Score: 2.00)

NJ Specific Threats: 8.1.4.1 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.6 Invasive non-native fungal/bacterial diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.1.6.1 The introduction of non-native fungal and bacterial diseases threatens native populations and ecosystems.

8.2 Problematic Native Species/Diseases

8.2.2 Named Species (Avg. Score: 1.00)

NJ Specific Threats: 8.2.2.2 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.4 Problematic Species/Diseases of Unknown Origin

8.4.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.4.1.1 Non-native or poorly understood diseases and parasites could potentially impact native animals.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.3 Agricultural and Forestry Effluents

9.3.2 Soil Erosion and Sedimentation (Avg. Score: 1.00)

NJ Specific Threats: 9.3.2.2 Soil erosion and sedimentation limit the re-establishment of plants needed by terrestrial wildlife as cover and a food base.

9.3.3 Herbicides and Pesticides (Avg. Score: 3.00)

NJ Specific Threats: 9.3.3.1 Pesticides degrade terrestrial and aquatic habitats, especially streams, ponds and wetlands. Aquatic wildlife are particularly sensitive to these contaminants, which can cause developmental and behavioral abnormalities and reproductive failure. Some contaminants may bioaccumulate in predatory fish and birds and disrupt reproduction.

9.3.3.3 Use of pesticides can directly harm non-target species through direct contact and/or by reducing and/or contaminating their food supply.

9.3.3.4 Use of herbicides can destroy beneficial food and nectar plants for insects.

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture (Avg. Score: 3.00)

NJ Specific Threats: 9.3.5.1 Use of pesticides, insecticides, and/or herbicides can directly harm non-target species, such as amphibians and beneficial invertebrates through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5.2 Use of herbicides can destroy beneficial food and nectar plants for insects.

9.3.5.4 Improper use of current insecticides, such as those containing esfenvalerate, prallethrin, or piperonyl butoxide, or past use of pesticides containing chlordane still present in the soils, are toxic to various wildlife species, and can cause injury, mortality, or other effects that impair population viability.

9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.5 Air-Bourne Pollutants

9.5.4 Other (Avg. Score: 1.00)

NJ Specific Threats: 9.5.4.1 Dust and/or airborne sedimentation from construction sites, agricultural operations or related earth disturbances can introduce mineral or organic sediments into adjacent wildlife habitats, degrading their quality and suitability for wildlife short-term and/or long-term.

9.5.6 Herbicides and Pesticides (Avg. Score: 3.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 3.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.6 Phenology Shifting or Alteration

11.6.1 Phenology shifts related to pollination ecology (Avg. Score: 1.00)

NJ Specific Threats: 11.6.1.1 Alters inter-specific relationships of wildlife and vegetation, ultimately leading to detrimental impacts on the ecological system.

11.6.3 Phenology shifts related to species redistribution (Avg. Score: 1.00)

NJ Specific Threats: 11.6.3.1 Shifts in timing of species migration, breeding and hibernation, and available food resources, as a result of wildlife range shifts driven by climate change.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 3.00)

NJ Specific Threats: 12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.2 Lack of up-to-date existing information (Avg. Score: 3.00)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.3 Need to answer research question (Avg. Score: 3.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.4 Need to develop new technique (Avg. Score: 3.00)

NJ Specific Threats: 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 1.00)

NJ Specific Threats: 12.3.0.1 Regulatory habitat protections within state land use regulations are spatially limited to specific geographic areas (e.g., Pinelands, Coastal Area) or geographic features (e.g., wetlands, streams) and so fail to protect critical habitats that exist outside of these regulated areas.

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.9 Prescribed burns implemented by the NJ Forest Fire Service are constrained by State air quality regulations to a timeframe where seasonal weather conditions are less than ideal for effective burning. As a result, the Forest Fire Service is limited in the number of overall prescribed burns it can implement to restore habitat for wildlife.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 1.00)

NJ Specific Threats:

12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.

12.4.0.5 Bureau of Forest Fire Management policy has traditionally implemented prescribed burns on State lands for the sole purpose of public safety (i.e., addressing hazard fuel reduction), missing opportunities to burn in a manner that would additionally manage habitat for ecological diversity.

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 3.00)

NJ Specific Threats:

14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 3.00)

NJ Specific Threats:

14.2.1.1 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various forest management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 1.00)

NJ Specific Threats:

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.5 Secure and promote the protection/restoration of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through incentive programs.

1.2.1.6 Secure and promote the protection/restoration of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.9 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing Forestry Stewardship Programs.

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.12 Create incentives (non-monetary and/or monetary) for land developers to redevelop abandoned areas (e.g., shopping centers, office complexes) to minimize the loss of natural habitats and reduce the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.14 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of herbicides and pesticides, and implementing more ecologically safe strategies when using such products.

1.2.1.15 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of rodenticides, and implementing more ecologically safe strategies when using such products.

1.2.1.16 Create incentives (non-monetary and/or monetary) within State regulations (mitigations requirements or credit, BMP satisfaction, etc.) to promote the use of retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.17 Develop a public-relations oriented certification program for private retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.18 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and land managers to control and reduce the impacts of invasive, native and non-native species in order to increase structural habitat diversity.

1.2.1.19 Create incentives for federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to farmers, woodland landowners, and private landowners to adopt and/or endorse consistent BMPs concerning controlled burns to maintain and/or improve wildlife habitat.

1.2.1.20 Coordinate across government agencies and non-government organizations to create or expand upon tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMP's.

1.2.1.21 Create and/or support market-based programs that subsidize or create branding for products derived sustainably from managed wildlife habitats.

1.2.1.22 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to horse/livestock farm owners and managers to increase structural habitat diversity in and around the farms by managing vegetation for a variety of species, in particular, farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

1.2.1.23 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to provide cost shares and/or plan approvals for management based on management approaches and prescriptions.

1.2.1.24 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners, with habitat of suitable patch size to support breeding grassland-dependent species, to alter the timing of vegetation management to benefit grassland and pollinator species.

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

1.2.1.28 Create incentives to implement dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

2 Direct Management of Natural Resources

2.3 Fire management

2.3.2 Fuel reduction

2.3.2.1 Prevent wildfires by reducing natural fuel (e.g., leaf litter).

2.3.3 Prescribed burning

2.3.3.1 Evaluate different management techniques of prescribed burns that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

2.3.3.2 Conduct prescribed burning in Northern New Jersey forests to maintain and regenerate a mosaic of upland forest habitats.

2.3.3.3 Conduct prescribed burning to improve wildlife habitat.

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.1 Control invasive insect infestations by implementing BMP strategies through biological, chemical and/or mechanical means that will depress, or when appropriate, eradicate populations in a manner that avoids excessive harm to non-target species using BMPs to control infestations and limit their spread based on an inventory of invasive insect distribution and response to outbreaks.

2.8.0.2 Develop, implement, monitor and evaluate pest control/management strategies to reduce the impacts of over-abundant wildlife species (native and/or native, invasive species) on native vegetation and the degradation of habitats supporting SGCN. Over-abundant wildlife species include but are not limited to mute swans, Canada geese, beaver and white-tailed deer.

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.5 Implement biologically safe and appropriate control/management strategies, and where appropriate, eradication strategies to reduce the impacts and/or limit the distribution of invasive and/or non-native plant species within or near aquatic systems using methods that will provide the most protection to the aquatic and riparian ecological system, and minimize disturbance to the soil and wildlife. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.8.0.6 Implement long-term management of invasive and/or non-native plants to help maintain functioning ecological systems and biological diversity, and to enhance travel corridors. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.2 Improve the availability of prey/food resources through terrestrial and aquatic plantings and habitat restoration for SGCN populations, in particular for those populations thought to be limited due wholly or in part to a lack of (or contaminated) food resources, and for migratory species (birds, bats, invertebrates).

2.10.0.3 Restore and/or enhance habitats to benefit urban-associated SGCN.

2.10.0.4 Restore and/or enhance suitable travel corridors connecting conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.8 Protect significant natural and/or unique communities by implementing best management practices when conducting habitat restoration strategies.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.10 Minimize the loss of important habitats (e.g., coastal scrub-shrub and grassy habitats, high and low marsh habitats, etc.) that provide nesting, migrating, and wintering areas for SGCN birds and other coastal and marsh-dependent species through habitat restoration efforts.

2.10.0.11 Restore and/or enhance critical migratory terrestrial and aquatic habitats (e.g., beach, grasslands, forest, scrub-shrub, etc.) for songbirds, raptors, shorebirds, waterfowl, bats and invertebrates through habitat restoration efforts and expand habitat restoration to adjacent private lands to increase the effective size of the habitat.

2.10.0.12 Create and/or maintain scrub-shrub habitats through revegetation efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.15 Restore and/or enhance terrestrial and aquatic habitats proximate to but not adjacent to roads and other transportation corridors for terrestrial-bound SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.10.0.21 Restore and/or enhance understory habitats that suppress invasive species and provide critical resources and enhance sheltering, foraging, and nesting cover for wildlife.

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.11.0.3 Create suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats through vegetation management.

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through vegetation management.

2.11.0.6 Reclaim degraded rare species habitats by conducting vegetation management needed to restore habitat value for the documented/target SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.23 Implement appropriate habitat management actions in areas where natural disturbances, such as wildfire, have been precluded.

2.11.0.24 Conduct vegetation management adjacent to aquatic habitats following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.25 Conduct vegetation management along access roads following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.26 Conduct vegetation management along roadsides and medians, avoiding peak activity periods for wildlife, that enhances wildlife dispersal naturally and safely across roads and similar barriers to/between terrestrial and/or aquatic habitats.

2.11.0.27 Conduct vegetation management for target shrub- or young forest-dependent SGCN following BMPs to minimize the risk of the establishment of invasive and non-native plants.

2.11.0.28 Conduct vegetation management in agricultural areas following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.29 Conduct vegetation management on transportation and service corridors (i.e., rights-of-way) following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.30 Identify and prioritize areas where various management tools (such as increasing salinity through the management of water levels or chemical applications) may be effective in reducing phragmites within and restoring marsh habitat.

2.11.0.31 In areas where vegetative communities are shifting due to fire suppression and controlled burns are not feasible, manage vegetation to improve wildlife habitat.

2.11.0.32 Increase structural habitat diversity around and when feasible, within agricultural landscapes by managing vegetation for a variety of species, in particular, those farms that have removed scrub-shrub habitat and/or fragmented forests, and by implementing ecologically best practices (e.g., no-till farming, maintaining hedgerows, buffer set-asides, etc.).

2.11.0.33 Increase structural habitat diversity by implementing long-term vegetation management to minimize the potential for the establishment of invasive and/or non-native plants that may outcompete native vegetation.

2.11.0.34 Increase structural habitat diversity by managing residential, commercial and recreational areas' landscapes for a variety of species. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.

2.11.0.38 Increase structural habitat diversity in and around horse/livestock farms by managing vegetation for a variety of species, in particular, in and around farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

2.11.0.39 Increase structural habitat diversity in and around solar farms by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.40 Increase structural habitat diversity surrounding areas used for energy, mining, and transportation and service corridors by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides, and avoid managing habitat during the breeding seasons for ground-nesting birds, reptiles, amphibians and small mammals.

2.11.0.41 Increase structural habitat diversity through the implementation of a variety of vegetation management practices such a prescribed burns (either increasing or decreasing their frequency depending on the site and objective), plantings, etc. that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.42 Increase structural habitat diversity within wind farms for terrestrial bound and low-flying species and around wind farms for other wildlife by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.43 Manage forests to increase variation in age structure and composition using BMPs that promote and maintain functioning ecological forest-based systems and biological diversity.

2.11.0.45 Regularly and/or rotationally create young forest habitat in targeted areas to maintain and regenerate a mosaic of upland forest habitats that will benefit shrub- and young forest-dependent species.

2.14 Wildlife disease management

2.14.0 Wildlife disease strategy development and investigation

2.14.0.1 Investigate diseases/pathogens impacting SGCN and/or their habitats.

2.14.0.2 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

2.14.0.3 Protect SGCN from exotic pathogen introduction or incident through implementation of a "rapid response plan"; DFW to give priority attention to these species in planning and/or implementing a response.

2.14.0.4 Conduct long-term monitoring of diseases in vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts.

2.14.0.5 Assess the impacts of diseases on the life cycles of wildlife.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.6 Conduct long-term studies on resident and migratory SGCN to determine if there are changes to the populations' demography (productivity, survival, dispersal) and/or to their critical and/or supporting habitats (i.e., diminishing in value, acreage or connectivity, etc.), in particular changes that would not maintain SGCN at viable levels for species populations. Update data and GIS maps; provide updated information to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.14 Identify areas with invasive, aquatic plants and animals and collect a detailed baseline assessment of the species' status and distribution. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort. Researchers and contractors performing Forest Stewardship Inventories and/or Plans on state lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.0.0.15 Conduct long-term monitoring of areas identified as having invasive, aquatic plants and animals to track the species' status/progress over time with or without the implementation of management strategies. Areas without management strategies should be assessed and prioritized for management/control. Areas where management strategies are being implemented should include an assessment of the management effort and identify/recommend and implement necessary changes to improve its success. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort.

3.0.0.26 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species including objectives and guidance pertaining to and the condition/status of critical and supporting habitats.

3.0.0.27 Evaluate the effectiveness of strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals through research and monitoring. Develop and provide NJ DEP and other appropriate governing agencies/commissions a summary of findings and recommendations to improve such efforts.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.7 Track (via a database that includes a GIS component) and research problematic species and diseases to determine their distribution, impacts on SGCN wildlife/wildlife communities, and develop potential control measures.

3.2.0.8 Implement and conduct long-term monitoring of control measures aimed at minimizing the impacts of problematic species and/or diseases to evaluate the effectiveness of such efforts and to identify and incorporate additional strategies as appropriate.

3.2.0.18 Conduct baseline surveys/inventories to better understand the distribution of fish and invertebrate (including freshwater mussels) populations.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.2 Age, size and sex structure

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.3 Baseline inventory

3.2.3.9 Investigate hazardous environmental issues that may impact grassland invertebrates.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.6 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) that could, through revegetation and/or enhancement efforts, become suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN.

3.3.1.7 Map and prioritize existing and potential areas for early succession forest management. Share the results with state, county and municipal planners.

3.3.1.8 Assess the availability and suitability of forest habitats for SGCN species (particularly reptiles and amphibians, birds, pollinators, and tiger beetles) in southern forests since Superstorm Sandy.

3.3.1.10 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and document fish SGCN habitats by plotting their distributions in GIS and submitting the data to the State for integration into the DEP's Biotics database.

3.3.1.16 Gather "best information" for spatial modeling and update/create a current model/depiction of anticipated habitat shifts from sea-level rise, flooding, etc.

3.3.1.17 Identify and map undeveloped roads and trails in all conserved forests, and create a database of locations. Integrate information regarding potentially sensitive areas.

3.3.1.18 Conduct an assessment using available data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels.

3.3.1.19 Identify and codify legal ORV access areas on state (and if appropriate, other conserved) lands. Provide GIS mapping to the landowner for potential use in directing such recreational activities.

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.2 Monitoring

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.8 Evaluate the effectiveness of current prescribed burning practices on Pinelands dependent species.

3.3.2.10 Evaluate the efficacy and success of different management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.3.2.11 Evaluate and compare the effectiveness of delayed mowing of warm season grass fields versus cool season hay fields to benefit grassland-dependent species.

3.3.2.12 Evaluate and compare the effectiveness of different management techniques (e.g., prescribed burning, mowing, brush-hogging, etc.) for maintaining suitable habitat for grassland-dependent species and species dependent upon early successional habitats.

3.3.2.13 Evaluate the effectiveness of management strategies (e.g., timing restrictions for mowing, cooperative agreements with utility companies for maintenance of rights-of-ways) that maintain and enhance large existing areas of grassland in perpetuity. Focus on habitat patches that can be managed to enhance the total size of suitable grassland habitat and create interspersed early-successional habitat.

3.3.2.15 Investigate the effectiveness of management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.3.2.20 Once a system is developed for reporting and qualifying new locations of invasive species, develop, implement and monitor/evaluate invasive species removal strategies at identified locations. Priority should be given to those areas critical to SGCN and/or contain unique and/or rare plant communities supporting SGCN and/or other fish/wildlife species.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.3 Develop/improve management techniques that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.9 Develop strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.3.16 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.3.19 Work with foresters to develop prescribed burning practices for Pinelands dependent species that increase or maintain habitat quality for these species in the Pinelands.

3.5.3.21 Develop management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.22 Identify (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) and modify management strategies (e.g., timing restrictions for mowing, cooperative agreements with utility companies for maintenance of rights-of-ways), based on research, that maintain and enhance large existing areas of grassland in perpetuity.

3.5.3.24 Based on research, modify management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.3.29 Explore the use of alternative vegetation (i.e., commodity crops) to address agriculture concerns.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.5 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

3.5.4.6 Investigate the feasibility of mitigating for the impacts of contaminants to vulnerable wildlife, particularly SGCN. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.5.4.14 Develop and implement agreements, and update existing agreements, with government agencies regarding the protection of critical SGCN habitats (e.g., significant breeding populations of beach nesting birds, colonial waterbird nesting areas, bat colonies, etc.).

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.18 Investigate the effectiveness of survey techniques through selected “ground truthing” and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

3.5.4.21 Develop BMPs to address problematic species and diseases of unknown origin.

4 Education

4.1 Educator/Instructor training

4.1.0 Public education

4.1.0.1 Provide educational resources and training programs to private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

5 Facilities and Areas

5.15 Wildlife Management Areas

5.15.6 Roads

5.15.6.1 Clearly post areas/roads where vehicle access is permitted.

5.15.6.2 Clearly post areas/trails where vehicle access is not permitted.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.7 Secure and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.8 Secure and protect scrub-shrub habitats for SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.8 Promote the protection of scrub-shrub habitats for SGCN through conservation area designations.

6.4 Private lands agreements

6.4.0 Private land agreement strategies

6.4.0.1 Enter into private lands agreements to expand control burns on private lands, in particular those adjacent to conserved lands to improve SGCN habitats.

7 Law Enforcement

7.1 Law enforcement

7.1.3 Sub-national Level

7.1.3.2 Increase the number of law enforcement officers tending to wildlife issues to a reasonable number to sufficiently cover the State and marine waters.

7.1.4 Scale Unspecified

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.26 Educate law enforcement personnel that there may be unauthorized research projects taking place and to encourage them to investigate any activities that appear to be harmful to wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.2 Develop a team of personnel from government entities, conservation organizations and other stakeholders engaged in oil/gas spill response for marine and freshwater habitats to develop a feasible plan for oil spill response and/or to amend NJ's current oil spill response plan that clearly outlines each organizations responsibilities and an assessment and location list of available equipment for boom deployment during oil spills.

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.1.0.4 Engage government agencies, conservation partners and other stakeholders in constructive dialogues encouraging them to influence policy change and the creation of incentives through a habitat bill and/or municipal ordinances for backyard habitat.

8.1.0.15 Engage government agencies, conservation partners and other stakeholders in discussions encouraging and supporting the creation of laws and policies requiring vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

8.1.0.16 Engage local governments in discussions regarding the importance of them adopting/passing ordinances which require assessing and addressing secondary impacts (i.e., ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

8.1.0.17 Engage municipalities in constructive dialogue to identify and minimize destruction of areas prioritized for early succession forest management.

8.1.0.18 Engage NJDOT, NJ Transit Authority and other road management entities, wildlife conservation organizations/agencies (e.g., Division of Fish and Wildlife, New Jersey Conservation Foundation, Conserve Wildlife Foundation of NJ), and communities and citizens in discussions regarding the importance of and methods to enhance habitat connectivity, and work together to develop feasible strategies for ensuring that wildlife can disperse naturally and safely across roads and similar barriers to terrestrial and/or aquatic habitats.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.20 Organize a small focal group of government and non-government agencies/organizations responsible for decisions regarding beach/dune management to share and coordinate their goals so that comprehensive planning can attempt to meet all needs.

8.1.0.21 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation human-subsidized and/or overabundant, native species cause to local nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.22 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation invasive species cause to native nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.26 Coordinate across federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to woodland landowners to adopt or endorse consistent best management practices concerning controlled burns to maintain and/or improve forested habitat for wildlife.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.34 Work with the NJ Education Association and Department of Education to design curriculum and outdoor experimental learning opportunities, and provide training to teachers on implementation of these activities.

8.1.0.37 Enlist landowners and NJ citizens in the protection of and survey efforts for SGCN, in particular rare species, by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management and wildlife-related volunteer programs.

8.1.0.38 Engage partners, stakeholders and land managers in constructive dialogue promoting forest stewardship for SGCN that use core forests and forested corridors.

8.1.0.40 Encourage researchers, land managers, naturalists and enthusiasts to follow proper procedures for the coordination and/or permitting of research/management activities involving wildlife and sensitive habitats, and discourage activities that alter vegetation or wetlands, or cause harm or disturbance to wildlife.

8.1.0.42 Engage citizens, wildlife observers and photographers through discussions and distributable information regarding the importance of and encouraging implementing responsible and ethical behavior when observing wildlife by developing an alliance of wildlife photographers and widely circulating recommendations on how to reduce impact.

8.1.0.44 Engage conservation partners, stakeholders, government agencies and other land stewards in constructive dialogues encouraging their inclusion of controlled burns in forest and other stewardship plans.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.1.0.48 Form cooperative partnerships with transportation and shipment agencies and companies to facilitate habitat creation and enhancement away from and outside of project areas and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.2 Recruitment and retention activities

8.2.3 For wildlife watching

8.2.3.1 Develop and implement nature-focused tourism opportunities including wildlife viewing sites, interpretive signage highlighting unique ecosystems/habitats, and wildlife-related recreational opportunities that do not negatively impact SGCN or their habitats.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.7 Develop and provide (or otherwise make publicly available) educational programs and/or materials that describe the negative impacts of off-road vehicles and watercraft use in and adjacent to critical SGCN habitats, and the importance of confining such activities to more appropriate locations and/or seasons.

8.3.0.8 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate recreationists and encourage landowners to eliminate garbage in the vicinity of suitable wildlife habitat, in particular SGCN habitat. Information should include the detrimental impacts garbage may have on various wildlife species.

8.3.0.9 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners and land managers to include only native plants in landscaping and restoration projects. Provide information to assist them in detecting problematic establishment of invasive, non-indigenous plants.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.11 Develop and provide (or otherwise make publicly available) educational programs and/or materials to the public, wildlife-related professionals, foresters, etc., that describe the value of species that are often feared (e.g., snakes, bats, spiders, Allegheny woodrat) and/or deemed a "nuisance" (e.g., squirrel, deer, snapping turtle), and therefore, persecuted by people. Include information on tolerance, proper identification, eviction from human dwellings, how to minimize the animal's presence on the property, and/or how to live in harmony with the animal.

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.24 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

8.3.0.25 Develop educational outreach programs for landowners, nurseries and the general public regarding the negative impacts of invasive and non-native plants on our natural communities.

8.3.0.26 Develop educational outreach programs for private and public landowners and land managers regarding the importance of and how to manage core forests and forested corridors in a way that will be beneficial for SGCN, particularly endangered, threatened and special concern species.

8.3.0.27 Develop educational outreach programs for public and private landowners and land managers regarding the importance of structural habitat diversity, methods to increase diversity, and/or incentive programs available to increase habitat diversity.

8.3.0.28 Develop educational outreach programs for public and private landowners and land managers regarding the importance of managing grasslands for grassland-dependent species, methods of management, and/or incentive programs available.

8.3.0.30 Develop educational outreach programs for private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.5 Develop a plan that directs the creation or expansion of energy or utility rights-of-way in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.6 Develop a plan that directs the creation or expansion of roads and railroads or the re-establishment of abandoned railroads within and adjacent to critical forested habitats in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.8 Develop a plan that focuses on strategies for oil pipelines to avoid sensitive habitats that would be highly impacted by oil spills.

9.1.0.9 Develop a plan that focuses on strategies to minimize the creation of renewable energy farms (e.g., solar, wind) and related infrastructures within and their impacts on forested habitats and the wildlife community.

9.1.0.10 Develop a plan that focuses on strategies to minimize the impacts of mining on critical forested habitats.

9.1.0.11 Develop a plan that focuses on strategies to minimize the impacts of power plants on critical forested habitats and the wildlife community.

9.1.0.13 Develop a plan to minimize agriculture that would result in groundwater withdrawal in critical forested areas.

9.1.0.15 Develop a plan to minimize fragmentation of terrestrial and aquatic habitats by roads.

9.1.0.16 Develop a plan to minimize new lawnscapes and preserve natural vegetation within and adjacent to critical forest areas.

9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

9.1.0.21 Develop a plan to minimize the use of any-sized dam in critical forested areas.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.2 Organizational strategic and CMS planning

9.2.1 Organizational strategic and operational planning

9.2.1.1 Identify and codify legal ORV access areas on state lands.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.5 Develop response plans to address disease outbreaks within wildlife populations, in particular SGCN.

9.3.1.7 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.10 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.15 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.1.16 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3 Habitat management planning

9.3.3.5 Develop a management plan using forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

9.3.3.7 Develop a management plan to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

9.3.3.8 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.3.13 Develop a management plan that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas and prevents or ameliorates near-term impacts of climate change throughout the State, but in particular within the coastal and Delaware Bay areas.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.16 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.3.17 Develop a management plan for prescribed burning that will benefit Pinelands dependent species and increase or maintain habitat quality for these species in the Pinelands.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.21 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.3.26 Develop a management plan for parcels of suitable size to be managed for native herbaceous plant species that support breeding grassland dependent species.

9.3.3.28 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.3.29 Develop habitat management plans aimed at reducing or eliminating negative impacts of ORVs.

9.3.3.32 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3.34 Include controlled burn prescriptions in forest and stewardship plans to improve wildlife habitat.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.12 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed solar farm projects to reduce habitat fragmentation and minimize impacts on wildlife.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.2 Provide technical support to public and private landowners and land managers for controlling invasive, native and non-native plant species in order to increase structural habitat diversity.

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.7 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on the importance of maintaining habitat connectivity, minimizing fragmentation, and the use of CHANJ products to help them target areas for such planning.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.11 Provide educational resources, training programs, and on-the-ground guidance to private and public landowners and land managers on the benefits of and for creating young forest and early succession habitat for SGCN.

11.2.0.12 Provide educational resources and technical support to public landowners and land managers for managing grasslands for grassland-dependent species.

11.2.0.15 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and landowners about the importance of retaining and in an effort to protect, create, enhance and/or restore vegetation along aquatic habitats.

11.2.0.17 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of vernal pools and the protection, enhancement and/or restoration of biologically appropriate buffers.

11.2.0.22 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

11.2.0.23 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to SGCN habitats to promote the protection and/or enhancement of those adjacent habitats to increase the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and that connect conserved SGCN habitats.

11.2.0.24 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers on how to manage vegetated roadside areas (e.g., mowing, brush-hogging, etc.) on a schedule that avoids peak activity periods for wildlife and therefore, minimizes harm.

11.2.0.25 Provide educational resources, training programs, and on-the-ground guidance to resource managers regarding the assessment of and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) related to residential and commercial development.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.1 Engage partners and stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.3 Provide educational resources, training programs, and on-the-ground guidance to DOD to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop and implement forest management and other practices that minimize disturbances to SGCN (i.e., beyond their federal requirements).

11.2.1.5 Provide educational resources, training programs, and on-the-ground guidance to municipalities, state and federal agency resource managers on tasks such as writing and integrating Beach Management Plans into other management documents.

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

11.2.2 With private landowners

11.2.2.1 Provide technical support to farming operations and woodland landowners on ways to decrease clean farming (edge-to-edge) practices and create ecotones to benefit bobwhite and other species dependent on early successional habitat.

100 Law and Policy

100. Legislation

100.1.2 National Level

100.1.2.1 Create legislation to establish markets for warm-season grasses to increase the permanency of this crop on the landscape.

100.1.3 Sub-national Level

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.4 County and Local

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.3 Expand the acreages and enhance the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN through local ordinances.

100.1.4.14 Adopt/pass local ordinances which require assessing and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100.1.5.5 Develop legislation to provide financial support for the New Jersey Invasive Species Strike Team.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.5 Develop policies that will promote improved and secure habitat connections between conserved SGCN habitats.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.12 Develop policies that promote the preservation and protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.23 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.24 Create legislation to establish markets for warm-season grasses to increase the permanency of this crop on the landscape.

100.3.0.31 Create or expand tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMPs.

100.3.0.32 Coordinate regulations across agencies to maximize availability of and enrollment in existing Forestry Stewardship Programs (e.g., "Woodland Stewards", Farm Bill, partners, etc.) to maintain and/or improve forest habitat.

100.3.0.38 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.3.0.39 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.3.0.40 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.45 Increase the controlled burn season to focus on restoring vegetative communities.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.48 Propose new State law or regulation mandating that a State-level "development impact fee" be assessed on all new development approved by municipalities (via the Municipal Land Use Law processes), and dedicate such monies to the development and implementation of regional Habitat Conservation Plans (or existing plans/programs serving the same regional function).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.53 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded rights-of-way corridors associated with energy transport/transmission.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100.3.0.73 Develop regulations that would exempt the conversion of lawns to native vegetation (beneficial to wildlife) from local lawn ordinances.

100.3.2 State Land Acquisition Programs

100.3.2.1 Increase opportunities for habitat restoration by making any necessary policy changes to state, federal and local land acquisition programs (e.g., Green Acres, Blue Acres, etc.) to allow for acquisition within abandoned or failing bay shore communities, including mechanisms to relocate displaced people and infrastructure.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.2 Create a policy that requires the NJ DEP to incorporate scientific information regarding climate change and sea level rise (e.g., predictions, habitat management/acquisition efforts to enhance resilience to inundation) on their websites and to work with other government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

100.4.0.3 Develop policies for mandatory buffer strips on preserved farmlands and state-owned agricultural lands.

100.4.0.8 Develop a white paper addressing the impacts that existing, new or expanded rights-of-way have upon wildlife, wildlife habitats and habitat connectivity.

100.4.0.10 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.4.0.11 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.4.0.12 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.4.0.13 Develop policies for different circumstances (e.g., roadsides and medians, riparian, aquatic and terrestrial habitats) that outline appropriate habitat/vegetation management strategies and schedules to minimize risks to and benefit wildlife.

100.4.0.14 Develop policies to facilitate agreements between eligible entities to manage appropriate conserved lands for grassland-dependent species, and to have access to/obtain restoration funds.

100.4.0.16 Develop policies to implement habitat management strategies that will increase the structural diversity surrounding areas used for energy, mining, and transportation and service corridors which include but are not limited to the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-

100.4.0.17 Develop policies to implement habitat management strategies, including prescribed burns, that will increase the structural diversity on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies to control and reduce the impacts of invasive, non-native species in order to increase structural habitat diversity.

100.4.0.18 Develop policies to minimize the extent of infrastructure associated with energy and service corridors or areas (e.g., wind and solar farms, pipelines, utility lines) and that require the implementation of habitat management strategies that will increase the structural diversity in the area including (e.g., the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides).

100.4.0.19 Develop regulations that will minimize the creation of new barriers, remove or replace current barriers with appropriately-sized systems to accommodate wildlife dispersal, and to minimize road widening and traffic volume increases within critical wildlife habitat areas.

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.24 Develop policies to provide financial support for the New Jersey Invasive Species Strike Team.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Freshwater Mussels

Focal species that comprise this Conservation Target:

Brook Floater	Dwarf Wedgemussel	Eastern Lampmussel
Green Floater	Triangle Floater	Yellow Lampmussel

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 1.17)

NJ Specific Threats:

- 1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.1.1.2 Loss, alteration and/or degradation of habitat.
- 1.1.1.5 Impervious surfaces can lead to a decrease in water recharge.
- 1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.
- 1.1.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 1.17)

NJ Specific Threats:

- 1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.2.1.2 Loss, alteration and/or degradation of habitat.
- 1.2.1.5 Impervious surfaces can lead to a decrease in water recharge.
- 1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.
- 1.2.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats:

- 1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.3.1.2 Loss, alteration and/or degradation of habitat.
- 1.3.1.4 Impervious surfaces can lead to a decrease in water recharge.
- 1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.
- 1.3.1.6 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

2 Agriculture and Aquaculture

2.3 Livestock Farming and Ranching

2.3.2 Small-holder Grazing (Avg. Score: 0.83)

NJ Specific Threats: 2.3.2.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.2.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

2.3.3 Agro-industry Grazing (Avg. Score: 0.83)

NJ Specific Threats: 2.3.3.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.3.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

2.4 Marine and Freshwater Aquaculture

2.4.1 Subsistence/Artisinal Aquaculture (Avg. Score: 1.00)

NJ Specific Threats: 2.4.1.1 May degrade freshwater and intertidal habitat due to farming techniques and damage from associated structures.

2.4.1.3 Potential for increased nutrient and effluent loads.

2.4.2 Industrial Aquaculture (Avg. Score: 2.00)

NJ Specific Threats: 2.4.2.1 May degrade freshwater and intertidal habitat due to farming techniques and damage from associated structures.

2.4.2.3 Potential for increased nutrient and effluent loads.

2.4.2.8 Potential for fish to escape and compete with, predate upon, or spread disease to fish species that serve as hosts for SGCN freshwater mussels.

3 Energy Production and Mining

3.1 Oil and Gas Facilities and Pipelines

3.1.1 Distribution processes of petroleum and other liquid hydrocarbons (Avg. Score: 3.00)

NJ Specific Threats: 3.1.1.1 Fragments terrestrial and aquatic habitats.

3.1.1.2 Loss, alteration and/or degradation of habitat.

3.1.1.3 Increased risk of oil spills.

3.1.2 Natural gas distribution processes (Avg. Score: 3.00)

NJ Specific Threats: 3.1.2.1 Fragments terrestrial and aquatic habitats.

3.1.2.2 Loss, alteration and/or degradation of habitat.

3.1.2.3 Increased risk of gas leaks and explosions.

3.2 Mining and Quarrying

3.2.2 Surface Mining - Rock Quarry (and sand quarries) (Avg. Score: 2.00)

NJ Specific Threats: 3.2.2.1 Fragments terrestrial and aquatic habitats.

3.2.2.2 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

3.4 Conventional Power Plants

3.4.0 Conventional Power Plants (Avg. Score: 2.00)

NJ Specific Threats: 3.4.0.2 Loss, alteration and/or degradation of habitat due to new or the expansion of current facilities.

3.4.0.3 Alteration of the temperature, pH and/or hydrology of aquatic ecosystems change plant communities and can harm wildlife and/or impact their behavior and survivorship.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 4.1.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species and inhibiting dispersal of non-volant animals, reducing gene flow.

4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads (Avg. Score: 1.00)

NJ Specific Threats: 4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

4.3 Shipping Lanes

4.3.2 Dredging impacts (Avg. Score: 2.00)

NJ Specific Threats: 4.3.2.1 Threatens wildlife by disrupting/removing stream bottom habitat.

5 Biological Resource Use

5.3 Logging and Wood Harvesting

5.3.1 Intentional Use (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.1.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.2 Intentional Use (large scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.2.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.3 Unintentional effects (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.3.2 Poorly planned/implemented tree harvesting adjacent to waterways and vernal pools can lead to increased water temperatures, soil erosion and sedimentation, and reduces the potential for woody debris within the aquatic system, leading to negative impacts on wildlife.

5.3.4 Unintentional effects (large scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.4.3 Poorly planned/implemented tree harvesting adjacent to waterways and vernal pools can lead to increased water temperatures, soil erosion and sedimentation, and reduces the potential for woody debris within the aquatic system, leading to negative impacts on wildlife.

5.4 Fishing and Harvesting of Aquatic Resources

5.4.1 Intentional Use (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.4.1.4 Illegal collection of aquatic and semi-aquatic wildlife can have detrimental impacts on populations.

5.4.2 Intentional Use (large scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.4.2.4 Illegal collection of aquatic and semi-aquatic wildlife can have detrimental impacts on populations.

5.4.3 Unintentional effects (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.4.3.7 Improperly sanitized equipment, relocation of fish, importation and release of non-native species, and the use of bait from a different location can spread invasive species and diseases from one waterbody to another.

5.4.4 Unintentional effects (large scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.4.4.7 Improperly sanitized equipment, relocation of fish, use of bait from a different location, can spread invasive species and diseases from one waterbody to another.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized) (Avg. Score: 1.00)

NJ Specific Threats: 6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.

6.1.1.3 Increased risk of harassment that results in a change in wildlife behavior and/or direct mortality from vehicle strikes.

6.1.1.6 Off-road vehicles can be a mechanism of transference of wildlife diseases and invasive plant species if gear and apparel are not properly sanitized between sites.

6.1.2 Boating (Avg. Score: 1.00)

NJ Specific Threats: 6.1.2.3 Motorized boat propellers can inflict physical harm aquatic wildlife species.

6.3 Work and Other Activities

6.3.1 Unauthorized research projects at significant habitats (Avg. Score: 1.00)

NJ Specific Threats: 6.3.1.1 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.1.4 Illegal transfer of freshwater fish from one waterbody/watershed to another can result in the spread of non-native, invasive and/or undesirable fish or mussel species and/or diseases.

6.3.1.5 Illegal transfer of freshwater mussels from one waterbody/watershed to another can result in the spread of non-native, invasive and/or undesirable mussel species and/or diseases.

6.3.2 Authorized research projects at significant habitats (Avg. Score: 1.00)

NJ Specific Threats: 6.3.2.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.2.5 Authorized transfer of freshwater fish from one waterbody/watershed to another can result in the spread of non-native, invasive and/or undesirable fish or mussel species and/or diseases.

6.3.2.6 Authorized transfer of freshwater mussels from one waterbody/watershed to another can result in the spread of non-native, invasive and/or undesirable mussel species and/or diseases.

6.3.3 Other "work" unrelated to research (Avg. Score: 1.00)

NJ Specific Threats: 6.3.3.1 Construction projects may disrupt normal wildlife behavior which can result in reduced reproductive success or survival, abandonment of critical sites, etc. (e.g., bridge-nesting birds).

6.3.3.5 Unauthorized manipulation of water level (for dam repair, dredging, aquatic vegetation control, etc.) particularly during spawning season or during the summer when temperatures are high and dissolved oxygen is low can have negative impacts on fish and fish habitat.

7 Natural Systems Modifications

7.2 Dams and Water Management/Use

7.2.1 Abstraction of Surface Water (domestic use) (Avg. Score: 2.00)

NJ Specific Threats: 7.2.1.1 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.1.2 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.1.3 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, and eliminates shallow water habitats.

7.2.1.4 Water intake systems associated with municipal water supply threaten aquatic organisms due to injury or mortality from impingement and/or entrainment.

7.2.2 Abstraction of Surface Water (commercial use) (Avg. Score: 3.00)

NJ Specific Threats: 7.2.2.1 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, eliminates shallow water habitats, and disrupts/removes stream bottom habitat.

7.2.2.2 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.2.3 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.2.4 Water intake systems associated with industrial use and power plants threaten aquatic organisms due to injury or mortality from impingement and/or entrainment.

7.2.3 Abstraction of Surface Water (agricultural use) (Avg. Score: 3.00)

NJ Specific Threats: 7.2.3.1 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.3.2 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, and eliminates shallow water habitats.

7.2.3.4 Water intake systems associated with agriculture threaten aquatic organisms due to injury or mortality from impingement and/or entrainment.

7.2.3.5 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.5 Abstraction of Ground Water (domestic use) (Avg. Score: 2.00)

NJ Specific Threats: 7.2.5.1 Heavy withdrawal of ground water for domestic use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.6 Abstraction of Ground Water (commercial use) (Avg. Score: 3.00)

NJ Specific Threats: 7.2.6.1 Heavy withdrawal of ground water for industrial and commercial use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.7 Abstraction of Ground Water (agricultural use) (Avg. Score: 2.83)

NJ Specific Threats: 7.2.7.1 Heavy withdrawal of ground water for agricultural use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.9 Small Dams (Avg. Score: 3.00)

NJ Specific Threats: 7.2.9.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.9.2 Dams act as a barrier to fish movement, limiting the distribution of anadromous fish and fish that act as hosts for mussels.

7.2.9.3 Dams act as a barrier to movement, limiting the ability of aquatic or semi-aquatic wildlife to move safely between habitats.

7.2.10 Large Dams (Avg. Score: 3.00)

NJ Specific Threats: 7.2.10.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.10.2 Dams act as a barrier to fish movement, limiting the distribution of anadromous fish and fish that act as hosts for mussels.

7.2.10.3 Dams act as a barrier to movement, limiting the ability of aquatic or semi-aquatic wildlife to move safely between habitats.

7.2.11 Dams (size unknown) (Avg. Score: 3.00)

NJ Specific Threats: 7.2.11.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.11.2 Dams act as a barrier to fish movement, limiting the distribution of anadromous fish and fish that act as hosts for mussels.

7.2.11.3 Dams act as a barrier to movement, limiting the ability of aquatic or semi-aquatic wildlife to move safely between habitats.

7.2.12 Culverts (Avg. Score: 2.00)

NJ Specific Threats: 7.2.12.1 Improper design, placement, installation and maintenance of culverts and other stream crossing structures can impede or prevent the movements of terrestrial organisms and can restrict or limit stream flow, impeding the movement of aquatic organisms along riparian corridors.

7.2.13 Stream Burial (Avg. Score: 1.00)

NJ Specific Threats: 7.2.13.1 Eliminates riparian habitats.

7.2.13.2 Eliminates in-stream habitat and water resources for wildlife.

7.2.13.3 Alters the hydrology and quality of downstream aquatic and riparian habitats.

7.3 Other Ecosystem Modifications

7.3.1 Shoreline Stabilization (Avg. Score: 1.00)

NJ Specific Threats: 7.3.1.2 Efforts to stabilize stream corridors, particularly near roads and infrastructure, in which vegetated and dynamic shorelines are replaced with unvegetated and rigid structures such as rip-rap, gabion, concrete raceways and bulkheads interfere with fish spawning, nursery and foraging areas.

7.3.3 Removal of coarse woody debris (streams, forests, scrub-shrub habitats) (Avg. Score: 1.00)

NJ Specific Threats: 7.3.3.1 Decreases the available detritus that normally accumulates behind and within stream obstructions, minimizing or eliminating food sources and shelters for fishes, invertebrates and amphibians.

7.3.3.2 Decreases habitat and/or corridor suitability due to limited or absent shelter and foraging habitat.

7.3.5 Poor habitat management (Avg. Score: 2.00)

NJ Specific Threats: 7.3.5.2 Shifting from natural vegetation to lawns can cause increased temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

7.3.5.4 Vegetation clearing or inappropriate alteration adjacent to aquatic habitats threatens aquatic species by degrading habitat and water quality (altering temperature and dissolved oxygen, increasing siltation and desiccation, etc.).

7.3.5.8 Storm water outfall pipes can create habitats in small streams that are conducive to non-native predatory fish which can negatively impact native fish species.

7.3.5.9 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, eliminates shallow water habitats, and disrupts/removes stream bottom habitat.

7.3.5.10 Ditching, draining and filling of marshes and wetlands eliminates habitat and degrades the remaining surrounding areas for wildlife.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species (Avg. Score: 2.00)

NJ Specific Threats: 8.1.1.1 Displace or outcompete native species for resources.

8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.

8.1.1.4 Invasive, non-native animals increase the risk of predation on native animals and/or herbivory on native vegetation.

8.1.1.5 Invasive, non-native animals and plants increase the risk of introduction and transference of diseases

8.1.1.6 Invasive, non-native plants may create physical barriers for some species.

8.1.2 Invasive non-native aquatic animals (Avg. Score: 2.00)

NJ Specific Threats: 8.1.2.2 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminishing habitat suitability and reducing ecological integrity of natural communities, and may introduce disease into a population.

8.1.3 Invasive non-native aquatic plants (Avg. Score: 2.00)

NJ Specific Threats: 8.1.3.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.5 Invasive non-native terrestrial/wetland plants (Avg. Score: 1.00)

NJ Specific Threats: 8.1.5.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.6 Invasive non-native fungal/bacterial diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.1.6.1 The introduction of non-native fungal and bacterial diseases threatens native populations and ecosystems.

8.2 Problematic Native Species/Diseases

8.2.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.2.1.3 Invasive, native species can out-compete non-invasive species for resources (food, light, shelter), leading to the demise of some species populations.

8.2.1.4 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.2.2 Named Species (Avg. Score: 1.00)

NJ Specific Threats: 8.2.2.2 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.4 Problematic Species/Diseases of Unknown Origin

8.4.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.4.1.1 Non-native or poorly understood diseases and parasites could potentially impact native animals.

8.5 Viral/Prion-induced Diseases

8.5.1 Unspecified Species (Disease) (Avg. Score: 1.00)

NJ Specific Threats: 8.5.1.1 There is a large knowledge gap regarding the existence of, or potential for, other diseases impacting native wildlife.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.1 Domestic and Urban Waste Water

9.1.1 Sewage (Avg. Score: 2.00)

NJ Specific Threats: 9.1.1.1 Degradation of aquatic and marine water quality and habitats by changing turbidity, flow and water chemistry.

9.1.1.2 Leads to increased eutrophication and algae blooms that result in oxygen depletion.

9.1.1.3 Contaminants in sewage treatment effluents and Combined Sewer Overflows can cause developmental and behavioral abnormalities and reproductive failure in wildlife.

9.1.2 Run-off (Avg. Score: 2.00)

NJ Specific Threats: 9.1.2.1 Chemical fertilizers and nutrient run-off changes the pH in streams and ponds and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.1.2.2 Contaminants degrade aquatic and marine water quality and can bioaccumulate in benthic organisms, threatening wildlife by causing developmental and behavioral abnormalities and reproductive failure.

9.1.2.3 Contaminants from road runoff (oil, sediment, salt, etc.) impact native vegetation and the species that rely upon them, degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2 Industrial and Military Effluents

9.2.1 Oil Spills (Avg. Score: 3.00)

NJ Specific Threats: 9.2.1.1 Oil spills render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.1.2 Oil spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.1.3 Oil spills cause external oiling of wildlife and ingestion of oil, both of which can injure or kill wildlife.

9.2.2 Seepage from Mining (Avg. Score: 1.00)

NJ Specific Threats: 9.2.2.1 Contaminants from mining degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2.3 Other (Avg. Score: 3.00)

NJ Specific Threats: 9.2.3.1 Point and nonpoint source pollution such as polychlorinated biphenyls (PCBs), pesticides, heavy metals, and endocrine disrupting compounds (EDC's) into freshwater and marine systems pose threats to wildlife through direct contact and/or ingestion, and to aquatic species and their predators through bioaccumulation, impacting the reproductive success and neurological function of many avian and fish species.

9.2.3.2 Chemical spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.3.3 Chemical spills may render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.4 Other: Hydrofracturing (Avg. Score: 1.00)

NJ Specific Threats: 9.2.4.1 Contaminants from hydrofracturing degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2.4.2 Uncontrolled effluents escaping from hydrofracturing facilities can cause injury to wildlife and alter normal behaviors.

9.3 Agricultural and Forestry Effluents

9.3.1 Nutrient Loads (Avg. Score: 2.00)

NJ Specific Threats: 9.3.1.1 Chemical fertilizers and nutrient run-off changes the pH in streams, ponds and wetlands and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.3.1.2 Animal waste degrades terrestrial and aquatic habitats, especially streams, ponds and wetlands, resulting in eutrophication, which disrupts oxygen and nutrient balances, and causes injury and mortality to aquatic organisms.

9.3.1.4 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades wetland and aquatic habitats with runoff, increasing sediment and nutrient loads and pH.

9.3.1.5 Conversion of native forests to plantations degrades wetland and aquatic habitats through increased runoff.

9.3.2 Soil Erosion and Sedimentation (Avg. Score: 2.00)

NJ Specific Threats: 9.3.2.1 Soil erosion, sedimentation and destruction of streambanks and riparian buffers degrade waters making them unsuitable for riparian-dependent wildlife.

9.3.2.3 Conversion of native forests to plantations degrades wetland and aquatic habitats through increased sedimentation.

9.3.3 Herbicides and Pesticides (Avg. Score: 2.00)

NJ Specific Threats: 9.3.3.1 Pesticides degrade terrestrial and aquatic habitats, especially streams, ponds and wetlands. Aquatic wildlife are particularly sensitive to these contaminants, which can cause developmental and behavioral abnormalities and reproductive failure. Some contaminants may bioaccumulate in predatory fish and birds and disrupt reproduction.

9.3.3.3 Use of pesticides can directly harm non-target species through direct contact and/or by reducing and/or contaminating their food supply.

9.3.4 Other (Avg. Score: 1.00)

NJ Specific Threats: 9.3.4.1 Spills, leaks or discharges of fuel, oil or other contaminant fluids from machinery or equipment used in the normal course of agricultural or forestry activities can degrade or destroy adjacent aquatic and terrestrial habitats and/or cause harm to non-target species (plants and animals).

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture (Avg. Score: 1.00)

NJ Specific Threats: 9.3.5.1 Use of pesticides, insecticides, and/or herbicides can directly harm non-target species, such as amphibians and beneficial invertebrates through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5.4 Improper use of current insecticides, such as those containing esfenvalerate, prallethrin, or piperonyl butoxide, or past use of pesticides containing chlordane still present in the soils, are toxic to various wildlife species, and can cause injury, mortality, or other effects that impair population viability.

9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.4 Garbage and Solid Waste

9.4.1 Direct hazards to wildlife (Avg. Score: 2.00)

NJ Specific Threats: 9.4.1.1 Wildlife may ingest garbage causing choking or impingement in the digestive system, or they may become physically entangled in it (e.g., plastic or abandoned fish nets); conditions that make them unable to feed or drink, cause them to suffocate or drown, or otherwise restrict the animal's movement making them more susceptible to predators, starvation or injury.

9.5 Air-Bourne Pollutants

9.5.1 Acid Rain (Avg. Score: 1.00)

NJ Specific Threats: 9.5.1.1 Causes acidification of water bodies, resulting in changes to aquatic and marine communities and reducing biodiversity, and creating conditions that are unsuitable for some aquatic (freshwater and marine) and semi-aquatic species that are sensitive to pH shifts.

9.5.1.2 Leaches calcium from the soils which in turn reduces the availability of prey, particularly calcium-rich prey such as snails.

9.5.4 Other (Avg. Score: 1.00)

NJ Specific Threats: 9.5.4.1 Dust and/or airborne sedimentation from construction sites, agricultural operations or related earth disturbances can introduce mineral or organic sediments into adjacent wildlife habitats, degrading their quality and suitability for wildlife short-term and/or long-term.

9.5.6 Herbicides and Pesticides (Avg. Score: 2.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

9.6 Excess Energy

9.6.2 Thermal Pollution (Avg. Score: 2.00)

NJ Specific Threats: 9.6.2.1 Water temperature changes due to industrial discharge of heated water may impact species composition in the receiving waterbody. Species such as sea turtles and migrating fish may be attracted to the thermal plume and become more vulnerable to mortality during emergency shutdowns during cooler months.

9.6.2.2 Water temperature changes to aquatic systems can deter or preclude use by SGCN (e.g., alter habitat suitability for wildlife species, reduce prey base) or present stressors that are harmful if not fatal to wildlife.

9.6.2.3 Water temperature changes due to industrial discharge of heated water in aquatic systems may be stressful/fatal to free floating freshwater mussel glochidia.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 2.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.2 Droughts

11.2.1 Droughts (Avg. Score: 2.83)

NJ Specific Threats: 11.2.1.1 Contribute to hardened soils, decreasing water recharge during rains and increasing the likelihood of flash floods during storms.

11.2.1.2 Lead to lower groundwater levels and therefore, less available water for people and habitats.

11.2.1.3 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

11.3 Temperature Extremes

11.3.1 Temperature extremes (Avg. Score: 2.33)

NJ Specific Threats: 11.3.1.1 Increasing temperatures may cause habitat loss and degradation by desiccating and/or raising the temperatures of small wetlands and streams leading to the loss of freshwater mussels and other aquatic species and species reliant upon these habitats.

11.3.1.2 Increased temperatures can negatively impact wetland, riverine, lacustrine and vernal pool-associated or -dependent wildlife by reducing flows, increasing water temperatures, lowering water levels and causing premature drying of vernal habitats.

11.4 Storms and Flooding

11.4.1 Storms and flooding (Avg. Score: 2.00)

NJ Specific Threats: 11.4.1.1 Extreme storms and flooding events threaten aquatic and marine wildlife through habitat degradation and alteration, including alterations to off-shore or back-bay benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic and marine wildlife.

11.4.1.3 Increase risk of saltwater intrusion to freshwater habitats altering the water chemistry and potentially altering aquatic wildlife community.

11.4.1.4 Flood events alter river or stream morphology, benthic conditions and habitat availability for wildlife, cause bank erosion, and deposit sediments in floodplain wetlands altering wildlife habitat.

11.4.2 Increased rainfall (Avg. Score: 2.00)

NJ Specific Threats: 11.4.2.1 Extreme rain events threaten aquatic wildlife through habitat degradation and alteration, including alterations to benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic wildlife.

11.4.2.3 More frequent rain events can alter terrestrial and wetland vegetation communities as well as wetland hydrology, shifting wildlife community use.

11.6 Phenology Shifting or Alteration

11.6.2 Phenology shifts related to predator-prey ecology (Avg. Score: 1.00)

NJ Specific Threats: 11.6.2.1 Alters inter-specific relationships (e.g., competition, parasitism, predation) of wildlife, ultimately leads to detrimental impacts on the ecological system.

11.6.2.2 Shifts timing of species migration, breeding and hibernation, and available food resources, causes redistribution of species, or mortality for species that are unable to relocate due to their already isolated habitat or limited mobility.

11.6.3 Phenology shifts related to species redistribution (Avg. Score: 1.00)

NJ Specific Threats: 11.6.3.1 Shifts in timing of species migration, breeding and hibernation, and available food resources, as a result of wildlife range shifts driven by climate change.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 2.00)

NJ Specific Threats: 12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.2 Lack of up-to-date existing information (Avg. Score: 2.00)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.3 Need to answer research question (Avg. Score: 2.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.4 Need to develop new technique (Avg. Score: 1.00)

NJ Specific Threats: 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 1.00)

NJ Specific Threats: 12.3.0.6 Certain geographic or habitat features, such as vernal pools and headwater wetlands or streams, may be too small, mischaracterized, or misidentified to benefit from regulatory protection.

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 1.00)

NJ Specific Threats: 12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 2.00)

NJ Specific Threats: 14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 2.00)

NJ Specific Threats: 14.2.1.2 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various aquatic and riparian management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 1.00)

NJ Specific Threats: 15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.6 Secure and promote the protection/restoration of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers through incentive programs.

1.2.1.7 Secure and promote the protection/restoration of fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.14 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of herbicides and pesticides, and implementing more ecologically safe strategies when using such products.

1.2.1.15 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of rodenticides, and implementing more ecologically safe strategies when using such products.

1.2.1.18 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and land managers to control and reduce the impacts of invasive, native and non-native species in order to increase structural habitat diversity.

1.2.1.20 Coordinate across government agencies and non-government organizations to create or expand upon tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMP's.

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

2 Direct Management of Natural Resources

2.2 Dam and barrier removal

2.2.1 Culvert work

2.2.1.1 Replace existing barriers to wildlife movement with and/or install appropriately-sized systems to accommodate wildlife dispersal.

2.2.5 Obstruction removal

2.2.5.1 Enhance fish SGCN habitats by removing obstructions to fish passage to benefit those species.

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.3 Work with NJ Invasive Species Strike Team to identify areas with and eradicate aquatic invasive species such as the Asian Swamp Eel, Northern Snakehead, and the Chinese pond mussel. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.5 Implement biologically safe and appropriate control/management strategies, and where appropriate, eradication strategies to reduce the impacts and/or limit the distribution of invasive and/or non-native plant species within or near aquatic systems using methods that will provide the most protection to the aquatic and riparian ecological system, and minimize disturbance to the soil and wildlife. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.4 Restore and/or enhance suitable travel corridors connecting conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.8 Protect significant natural and/or unique communities by implementing best management practices when conducting habitat restoration strategies.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.11 Restore and/or enhance critical migratory terrestrial and aquatic habitats (e.g., beach, grasslands, forest, scrub-shrub, etc.) for songbirds, raptors, shorebirds, waterfowl, bats and invertebrates through habitat restoration efforts and expand habitat restoration to adjacent private lands to increase the effective size of the habitat.

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.10.0.25 Enhance SGCN fish habitats through aquatic and riparian vegetation restoration.

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.13 Implement best management practices (BMPs), protective strategies, and guidelines for vegetation management to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.11.0.21 Minimize the degradation, alteration and/or changes in hydrology of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and subsequent disturbances to and behavioral changes of wildlife by maintaining or enhancing these areas and biologically appropriate buffers through habitat management and/or revegetation or restoration efforts.

2.11.0.35 Increase structural habitat diversity by managing vegetation adjacent to aquatic habitats in a manner that provides a buffer from runoff and erosion and a microclimate to stabilize seasonal temperatures to benefit a variety of aquatic and semi-aquatic species.

2.11.0.37 Increase structural habitat diversity by minimizing the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats which benefits wildlife.

2.11.0.38 Increase structural habitat diversity in and around horse/livestock farms by managing vegetation for a variety of species, in particular, in and around farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

2.12 Water management

2.12.1 Ditch plugs

2.12.1.1 Implement best management practices (BMPs), protective strategies, and guidelines for ditch plugging to maintain and enhance healthy, resident and migratory SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.13 Wildlife damage management

2.13.0 Nuisance fish and wildlife damage

2.13.0.4 Investigate the effects of mosquito control methods on freshwater aquatic and semi-aquatic SGCN including but not limited to, amphibian, fish, dragonfly, and damselfly populations.

2.13.0.5 Investigate the impacts of human-subsidized and/or naturally occurring predator species on SGCN to assess the need for integrated wildlife damage management techniques (e.g., predator exclosures, fish blockages, electric fence, culls) and/or policy changes on state land management that minimize the impacts of human-subsidized predators.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.6 Conduct long-term studies on resident and migratory SGCN to determine if there are changes to the populations' demography (productivity, survival, dispersal) and/or to their critical and/or supporting habitats (i.e., diminishing in value, acreage or connectivity, etc.), in particular changes that would not maintain SGCN at viable levels for species populations. Update data and GIS maps; provide updated information to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.14 Identify areas with invasive, aquatic plants and animals and collect a detailed baseline assessment of the species' status and distribution. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort. Researchers and contractors performing Forest Stewardship Inventories and/or Plans on state lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.0.0.15 Conduct long-term monitoring of areas identified as having invasive, aquatic plants and animals to track the species' status/progress over time with or without the implementation of management strategies. Areas without management strategies should be assessed and prioritized for management/control. Areas where management strategies are being implemented should include an assessment of the management effort and identify/recommend and implement necessary changes to improve its success. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort.

3.0.0.19 Identify the presence and status (e.g., functioning, structure, slated for removal, etc.) of existing dams and culverts within and/or that may impact SGCN and their habitats, and create a database that includes a GIS component identifying the locations of such structures and their status. Share this information with appropriate organizations and/or agencies evaluating the benefits and risks of such structures on SGCN and their habitats.

3.0.0.20 Once baseline data identifying and describing the status of existing dams and culverts have been gathered, conduct evaluations at a variety of sites to determine whether the benefits of culvert and dam creation or removal outweigh the risks to SGCN species and their habitats, and if other variables/conditions specific to individual sites/locations result in a different outcome. Identify and target appropriate dams and culverts for removal and/or reconstruction to minimize harm to SGCN species and their habitats.

3.0.0.22 Develop, implement and evaluate the success of a habitat improvement and restoration program to restore cold-water fish habitat, ecosystems and populations.

3.0.0.23 Identify (through wildlife and aquatic system surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and research water quality parameters for all [types of] aquatic systems for various SGCN populations.

3.0.0.26 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species including objectives and guidance pertaining to and the condition/status of critical and supporting habitats.

3.0.0.27 Evaluate the effectiveness of strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals through research and monitoring. Develop and provide NJ DEP and other appropriate governing agencies/commissions a summary of findings and recommendations to improve such efforts.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.2 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.0.3 Survey for and monitor populations of freshwater aquatic focal SGCN to assess the populations' demography, trends, condition, distribution, etc.

3.2.0.5 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

3.2.0.7 Track (via a database that includes a GIS component) and research problematic species and diseases to determine their distribution, impacts on SGCN wildlife/wildlife communities, and develop potential control measures.

3.2.0.8 Implement and conduct long-term monitoring of control measures aimed at minimizing the impacts of problematic species and/or diseases to evaluate the effectiveness of such efforts and to identify and incorporate additional strategies as appropriate.

3.2.0.10 Evaluate the effectiveness of sanitation/decontamination protocols in minimizing the transference of wildlife diseases and invasive plant species.

3.2.0.12 Investigate the impacts of ORV use and ORV-created noise on terrestrial and aquatic wildlife behavior and the impact of direct mortality from vehicle strikes. Integrate this information when mapping undeveloped roads and trails to identify potentially sensitive areas in northern NJ forests.

3.2.0.18 Conduct baseline surveys/inventories to better understand the distribution of fish and invertebrate (including freshwater mussels) populations.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.2 Age, size and sex structure

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.3 Baseline inventory

3.2.3.6 Investigate the feasibility and potential for success of conducting genetic rescue through translocation and/or reintroduction of animals into suitable habitat that was historically occupied to increase genetic diversity and reconnect isolated populations. Methods of investigation should include, but are not limited to, thorough literature reviews, expert opinions, identifying potential pitfalls (e.g., species' fidelity to their range or critical areas), and an examination of historic and current SGCN population distribution and suitable habitat availability.

3.2.5 Genetics

3.2.5.1 Investigate the feasibility and potential for success of conducting genetic rescue through translocation and/or reintroduction of animals into suitable habitat that was historically occupied to increase genetic diversity and reconnect isolated populations. Methods of investigation should include, but are not limited to, thorough literature reviews, expert opinions, identifying potential pitfalls (e.g., species' fidelity to their range or critical areas), and an examination of historic and current SGCN population distribution and suitable habitat availability.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.10 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and document fish SGCN habitats by plotting their distributions in GIS and submitting the data to the State for integration into the DEP's Biotics database.

3.3.1.11 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the quality and importance of areas with submerged aquatic vegetation to benefit waterfowl, finfish, and shellfish species.

3.3.1.16 Gather "best information" for spatial modeling and update/create a current model/depiction of anticipated habitat shifts from sea-level rise, flooding, etc.

3.3.1.18 Conduct an assessment using available data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels.

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.1.26 Survey all historic locations and unsurveyed suitable habitats to identify populations of freshwater aquatic focal species.

3.3.2 Monitoring

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.4 Protect water quality and aquatic-dependent species by appropriately designating Category 1 waters and enforcing protective regulations. Seek appropriate classifications for stream segments based on Endangered and Threatened Status and/or the Index of Biotic Integrity (IBI) results that do not fulfill Category One requirements.

3.3.2.5 Conduct long-term monitoring of water quality of SGCN aquatic habitats (and aquatic systems feeding into those habitats) to evaluate protection and management efforts to reduce, if not eliminate, chemical contamination, siltation, eutrophication, and other forms of pollution/contamination of aquatic systems.

3.3.2.14 Research and evaluate the effectiveness of water quality management practices on water-dependent and semi-dependent SGCN, particularly those practices associated with permitting or mitigation actions.

3.3.2.15 Investigate the effectiveness of management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.3.2.20 Once a system is developed for reporting and qualifying new locations of invasive species, develop, implement and monitor/evaluate invasive species removal strategies at identified locations. Priority should be given to those areas critical to SGCN and/or contain unique and/or rare plant communities supporting SGCN and/or other fish/wildlife species.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.8 Develop best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.14 Develop aquaculture practices in the coastal areas that are compatible with the recovery of SGCN.

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.3.16 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.3.23 Revise water quality management practices based on research on water-dependent and semi-dependent SGCN, particularly when associated with permitting or mitigation actions.

3.5.3.24 Based on research, modify management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.3.27 Conduct an assessment and develop a location list of available equipment for boom deployment during oil spills.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.4 Investigate the effects of mosquito control methods on freshwater aquatic and semi-aquatic SGCN including but not limited to, amphibian, fish, dragonfly, and damselfly populations.

3.5.4.7 Investigate the feasibility and potential for success of conducting genetic rescue through translocation and/or reintroduction of animals into suitable habitat that was historically occupied to increase genetic diversity and reconnect isolated populations. Methods of investigation should include, but are not limited to, thorough literature reviews, expert opinions, identifying potential pitfalls (e.g., species' fidelity to their range or critical areas), and an examination of historic and current SGCN population distribution and suitable habitat availability.

3.5.4.13 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.4.14 Develop and implement agreements, and update existing agreements, with government agencies regarding the protection of critical SGCN habitats (e.g., significant breeding populations of beach nesting birds, colonial waterbird nesting areas, bat colonies, etc.).

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.17 Investigate new, non-invasive techniques for SGCN population evaluation through literature review, expert opinion, trial studies (if low risk), etc.

3.5.4.18 Investigate the effectiveness of survey techniques through selected “ground truthing” and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

3.5.4.21 Develop BMPs to address problematic species and diseases of unknown origin.

3.5.4.23 Reduce the impacts of entrainment, impingement and thermal discharge at power plants by working with conservation partners, academia, etc. to ensure that best available technologies are utilized wherever possible.

4 Education

4.1 Educator/Instructor training

4.1.0 Public education

4.1.0.1 Provide educational resources and training programs to private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

4.1.1 Aquatic resource education

4.1.1.1 Provide educational resources and training programs to teachers in aquatic resource education that includes information regarding climate change and sea-level rise for incorporation into the class curriculum and/or as the focus of school field trips.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.3 Secure and protect riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.4 Secure and protect fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.3 Increase the protection of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through conservation area designations.

6.3.0.4 Promote the protection of fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through conservation area designations.

7 Law Enforcement

7.1 Law enforcement

7.1.3 Sub-national Level

7.1.3.2 Increase the number of law enforcement officers tending to wildlife issues to a reasonable number to sufficiently cover the State and marine waters.

7.1.4 Scale Unspecified

7.1.4.1 Improve enforcement of policies and/or regulations that promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

7.1.4.3 Increase law enforcement presence proximate to sensitive areas [e.g., avian nesting sites, in particular rookeries, and reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively)] to deter human activity and subsequent disturbance to SGCN.

7.1.4.6 Recruit law enforcement to assist in the protection and enhancement of SGCN populations, in particular endangered species, through improved awareness of species through trainings, partnerships, and other methods. Information should include but is not limited to: 1) Issues concerning illegal collection of reptiles, 2) Persecution of rare snakes, 3) Illegal recreational activities on public lands (e.g., off-road vehicles) and their impact on wildlife, 4) Identification of sensitive areas, critical sites and/or "hot-spots" for collection.

7.1.4.7 Increase law enforcement presence to enforce regulations governing recreational activities (e.g., the use of personal watercraft and off road vehicles, caving, rock climbing, etc.) on conserved lands and within other sensitive habitats, and discourage activities that cause harm or disturbance to vegetation, wetlands, fish and wildlife.

7.1.4.9 Implement policies that improve and secure habitat connections between conserved SGCN habitats.

7.1.4.10 Implement policies that promotes expanding acreages and enhances the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.16 Implement policies that protect and restore riparian areas.

7.1.4.17 Improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

7.1.4.26 Educate law enforcement personnel that there may be unauthorized research projects taking place and to encourage them to investigate any activities that appear to be harmful to wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.1 Coordinate research efforts among government agencies, non-government conservation partners and other stakeholders to investigate the impacts of aquaculture on migratory shorebirds, waterfowl, finfish, shellfish and other SGCN and their habitats, to determine relative effects of farming locations and aquaculture techniques, and to evaluate management actions to minimize such impacts.

8.1.0.2 Develop a team of personnel from government entities, conservation organizations and other stakeholders engaged in oil/gas spill response for marine and freshwater habitats to develop a feasible plan for oil spill response and/or to amend NJ's current oil spill response plan that clearly outlines each organizations responsibilities and an assessment and location list of available equipment for boom deployment during oil spills.

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.1.0.4 Engage government agencies, conservation partners and other stakeholders in constructive dialogues encouraging them to influence policy change and the creation of incentives through a habitat bill and/or municipal ordinances for backyard habitat.

8.1.0.15 Engage government agencies, conservation partners and other stakeholders in discussions encouraging and supporting the creation of laws and policies requiring vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

8.1.0.16 Engage local governments in discussions regarding the importance of them adopting/passing ordinances which require assessing and addressing secondary impacts (i.e., ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

8.1.0.18 Engage NJDOT, NJ Transit Authority and other road management entities, wildlife conservation organizations/agencies (e.g., Division of Fish and Wildlife, New Jersey Conservation Foundation, Conserve Wildlife Foundation of NJ), and communities and citizens in discussions regarding the importance of and methods to enhance habitat connectivity, and work together to develop feasible strategies for ensuring that wildlife can disperse naturally and safely across roads and similar barriers to terrestrial and/or aquatic habitats.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.37 Enlist landowners and NJ citizens in the protection of and survey efforts for SGCN, in particular rare species, by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management and wildlife-related volunteer programs.

8.1.0.40 Encourage researchers, land managers, naturalists and enthusiasts to follow proper procedures for the coordination and/or permitting of research/management activities involving wildlife and sensitive habitats, and discourage activities that alter vegetation or wetlands, or cause harm or disturbance to wildlife.

8.1.0.42 Engage citizens, wildlife observers and photographers through discussions and distributable information regarding the importance of and encouraging implementing responsible and ethical behavior when observing wildlife by developing an alliance of wildlife photographers and widely circulating recommendations on how to reduce impact.

8.1.0.46 Form cooperative partnerships with dredging companies to facilitate habitat creation and enhancement within project areas, and to identify seasonal timing of activities that would minimize impacts to wildlife and their habitats.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.1.0.49 Reduce the impacts of entrainment, impingement and thermal discharge at power plants by working with conservation partners, academia, etc. to ensure that best available technologies are utilized wherever possible.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.8 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate recreationists and encourage landowners to eliminate garbage in the vicinity of suitable wildlife habitat, in particular SGCN habitat. Information should include the detrimental impacts garbage may have on various wildlife species.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.15 Develop an educational outreach program for citizens regarding: 1) The impacts to wildlife as a result of plastic bags entering aquatic and marine systems, 2) The importance of decreasing the amount of plastic shopping bags in circulation, 3) The need for businesses to voluntarily charge for bags or reimburse people for using their own non-plastic bags, and 4) The need for their assistance through public pressure on legislators and government to pass legislation that that limits the amount of plastic shopping bags in circulation.

8.3.0.29 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about the importance of maintaining a vegetative buffer along riparian and aquatic habitats to intercept storm water runoff and minimize soil erosion.

8.3.0.30 Develop educational outreach programs for private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.5 Develop a plan that directs the creation or expansion of energy or utility rights-of-way in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.7 Develop a plan that directs the maintenance of or new channelization of forested streams and rivers in a manner that minimizes impacts of the aquatic ecological system and adjacent forest

9.1.0.8 Develop a plan that focuses on strategies for oil pipelines to avoid sensitive habitats that would be highly impacted by oil spills.

9.1.0.15 Develop a plan to minimize fragmentation of terrestrial and aquatic habitats by roads.

9.1.0.17 Develop a plan to minimize nutrient and effluent loads from aquaculture practices.

9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

9.1.0.20 Develop a plan to minimize the impacts of existing agricultural properties adjacent to and the conversion of forest habitats (terrestrial and aquatic, within or adjacent to critical forests) to agriculture, grazing areas/livestock farms, and plantations.

9.1.0.21 Develop a plan to minimize the use of any-sized dam in critical forested areas.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.24 Develop a plan to prevent livestock from entering water bodies in critical forested habitats.

9.1.0.25 Develop a plan to prevent the conversion of forested stream buffers to pastures in critical forested habitats.

9.1.0.26 Develop a plan to minimize any adverse impacts of aquaculture farming techniques and structures on freshwater and intertidal habitats.

9.1.0.27 Develop a plan to use wildlife-appropriate culverts in critical forested areas.

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.32 Incorporate aquatic habitat connectivity and water quality/effluent standards into local and state aquaculture plans and BMPs.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.2 Organizational strategic and CMS planning

9.2.1 Organizational strategic and operational planning

9.2.1.1 Identify and codify legal ORV access areas on state lands.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.6 Amend NJ's current oil spill response plan to 1) expand the geographic area addressed, 2) expand the targeted species impacted and in need of recovery, and 3) revise current and integrate new actions into the plan as needed.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.15 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.2 Listed species recovery planning

9.3.2.1 Develop proactive species recovery plans for all endangered and threatened species including guidance and objectives pertaining to critical and supporting habitat to meet and maintain recovery goals.

9.3.3 Habitat management planning

9.3.3.6 Develop a management plan for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

9.3.3.9 Develop a response plan to outbreaks using BMPs to control infestations and limit their spread in a way that avoids excessive harm to non-target species.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.3.13 Develop a management plan that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas and prevents or ameliorates near-term impacts of climate change throughout the State, but in particular within the coastal and Delaware Bay areas.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.16 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.21 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.3.24 Develop a plan to improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

9.3.3.28 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.3.29 Develop habitat management plans aimed at reducing or eliminating negative impacts of ORVs.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.3 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.2.2 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.2.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into the environmental review process to help establish policies and plans that minimize the impact of aquaculture on fish and wildlife.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.2 Provide technical support to public and private landowners and land managers for controlling invasive, native and non-native plant species in order to increase structural habitat diversity.

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.7 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on the importance of maintaining habitat connectivity, minimizing fragmentation, and the use of CHANJ products to help them target areas for such planning.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.14 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters), and to enhance or restore biologically appropriate buffers.

11.2.0.15 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and landowners about the importance of retaining and in an effort to protect, create, enhance and/or restore vegetation along aquatic habitats.

11.2.0.18 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats.

11.2.0.23 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to SGCN habitats to promote the protection and/or enhancement of those adjacent habitats to increase the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and that connect conserved SGCN habitats.

11.2.0.25 Provide educational resources, training programs, and on-the-ground guidance to resource managers regarding the assessment of and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) related to residential and commercial development.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.1 Engage partners and stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.4 Provide educational resources, training programs, and on-the-ground guidance to dredging companies and resource managers on habitat creation and enhancement away from and outside of shipping lanes, and to identify seasonal timing of activities that would minimize impacts to wildlife and their habitats.

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

100 Law and Policy

100. Legislation

100.1.3 Sub-national Level

100.1.3.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.3.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.4 County and Local

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.3 Expand the acreages and enhance the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN through local ordinances.

100.1.4.4 Secure wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and biologically appropriate buffers through local ordinances.

100.1.4.5 Secure SGCN-inhabited/used freshwater wetlands and biologically appropriate buffers through local ordinances.

100.1.4.6 Secure fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through local ordinances.

100.1.4.11 Secure riparian areas through local ordinances.

100.1.4.14 Adopt/pass local ordinances which require assessing and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.5.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.5.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into state/local policy to minimize the impact of aquaculture on fish and wildlife.

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100.1.5.5 Develop legislation to provide financial support for the New Jersey Invasive Species Strike Team.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.1 Develop (and/or improve) policies and/or regulations that will promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

100.3.0.5 Develop policies that will promote improved and secure habitat connections between conserved SGCN habitats.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.13 Develop policies that will promote protecting and restoring riparian areas.

100.3.0.14 Develop policies and/or regulations that increase the protective buffers of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) to biologically appropriate distances to benefit SGCN that rely upon these habitats and improve the function of the [associated] aquatic systems.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.26 Adopt regulations requiring the combined sewer overflow alternative analyses required by regulation address potential impacts to wildlife in watercourses or receiving water bodies.

100.3.0.40 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.

100.3.0.42 Fully adopt the former Storm water Management Rules' 300ft buffer requirements into the Flood Hazard Area Control Act Rules.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.53 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded rights-of-way corridors associated with energy transport/transmission.

100.3.0.54 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded surface mining areas.

100.3.0.55 Develop regulations to address potentially adverse effects of aquaculture on SGCN species and their habitats.

100.3.0.57 Develop regulations that when implemented will improve and secure habitat connections between conserved SGCN habitats.

100.3.0.58 Develop regulations that when implemented will promote the expansion of acreages and enhancement of the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.64 Develop regulations that when implemented will protect and restore riparian areas.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.3 Develop policies for mandatory buffer strips on preserved farmlands and state-owned agricultural lands.

100.4.0.8 Develop a white paper addressing the impacts that existing, new or expanded rights-of-way have upon wildlife, wildlife habitats and habitat connectivity.

100.4.0.9 Develop and implement policies to minimize the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats in order to benefit wildlife.

100.4.0.12 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.4.0.13 Develop policies for different circumstances (e.g., roadsides and medians, riparian, aquatic and terrestrial habitats) that outline appropriate habitat/vegetation management strategies and schedules to minimize risks to and benefit wildlife.

100.4.0.18 Develop policies to minimize the extent of infrastructure associated with energy and service corridors or areas (e.g., wind and solar farms, pipelines, utility lines) and that require the implementation of habitat management strategies that will increase the structural diversity in the area including (e.g., the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides).

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.21 Ensure that Section 303(d) of the Clean Water Act and applicable State statutory/regulatory requirements for surface water pollutant budgets are being met by monitoring and enforcing regulatory Total Maximum Daily Load (TMDL) targets established within regional Water Quality Management Plans.

100.4.0.22 Work with NJ DEP's Division of Land Use Regulation to ensure protection of listed species and their habitats during stream cleaning events.

100.4.0.24 Develop policies to provide financial support for the New Jersey Invasive Species Strike Team.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Frosted Elfin

Focal species that comprise this Conservation Target:

Frosted Elfin

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:
- 1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.1.1.2 Loss, alteration and/or degradation of habitat.
- 1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:
- 1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.2.1.2 Loss, alteration and/or degradation of habitat.
- 1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:
- 1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.3.1.2 Loss, alteration and/or degradation of habitat.
- 1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture (Avg. Score: 3.00)

NJ Specific Threats:
- 2.1.1.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.2 Small-holder Farming (Avg. Score: 1.00)

NJ Specific Threats:
- 2.1.2.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.
- 2.1.2.2 Fragments terrestrial and aquatic habitats.
- 2.1.2.4 Agricultural practices (e.g., mechanized, row-crop agriculture) can cause direct mortality to wildlife when harvesting takes places.

2.1.3 Agro-industry (Avg. Score: 3.00)

NJ Specific Threats: 2.1.3.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.3.2 Fragments terrestrial and aquatic habitats.

2.1.3.5 Loss of ecotones by implementing clean farming (edge-to-edge) practices degrades habitat for early successional wildlife.

2.2 Wood and Pulp Plantations

2.2.1 Small Holder (Avg. Score: 1.00)

NJ Specific Threats: 2.2.1.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.2.2 Agro-industry Plantations (Avg. Score: 1.00)

NJ Specific Threats: 2.2.2.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.3 Livestock Farming and Ranching

2.3.2 Small-holder Grazing (Avg. Score: 1.00)

NJ Specific Threats: 2.3.2.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.2.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

2.3.2.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.2.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

2.3.3 Agro-industry Grazing (Avg. Score: 3.00)

NJ Specific Threats: 2.3.3.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.3.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

2.3.3.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.3.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

3 Energy Production and Mining

3.2 Mining and Quarrying

3.2.2 Surface Mining - Rock Quarry (and sand quarries) (Avg. Score: 1.00)

NJ Specific Threats: 3.2.2.1 Fragments terrestrial and aquatic habitats.

3.2.2.2 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

3.3 Renewable Energy

3.3.2 Solar Power (Avg. Score: 1.00)

NJ Specific Threats: 3.3.2.2 Loss, alteration and/or degradation of habitat.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.1.1.3 Re-establishment of abandoned railroad lines may displace wildlife, in particular, less mobile species using the area to fulfill critical life history requirements.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads (Avg. Score: 1.00)

NJ Specific Threats:

4.2.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species, inhibiting dispersal of non-volant animals, reducing gene flow, and creating barriers to fish when service line-associated roads cross streams (e.g., bridges, culverts, fords, etc.).

4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

4.2.2 Management of rights-of-way or communication tower facilities and/or their associated access roads (Avg. Score: 3.00)

NJ Specific Threats:

4.2.2.1 Improper or poorly scheduled vegetation management can cause direct mortality to and may reduce productivity of wildlife.

5 Biological Resource Use

5.1 Hunting and Collecting Terrestrial Animals

5.1.1 Intentional Use (Avg. Score: 1.00)

NJ Specific Threats:

5.1.1.1 Illegal collection of wildlife can have detrimental impacts on populations.

5.2 Gathering Terrestrial Plants

5.2.3 Control (Avg. Score: 2.00)

NJ Specific Threats:

5.2.3.1 Alteration or control of undesirable plants or plant communities can destroy important food and nectar plants for native insects and animals.

5.3 Logging and Wood Harvesting

5.3.1 Intentional Use (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats:

5.3.1.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.1.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.1.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.1.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.1.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.1.6 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices in Atlantic White Cedar stands may destroy a unique wildlife wetland habitat that is difficult, and takes time, to restore.

5.3.2 Intentional Use (large scale) (Avg. Score: 1.00)

NJ Specific Threats:

5.3.2.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.2.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.2.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.2.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.2.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.2.6 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices in Atlantic White Cedar stands may destroy a unique wildlife wetland habitat that is difficult, and takes time, to restore.

5.3.3 Unintentional effects (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.3.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4 Unintentional effects (large scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.4.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4.5 Lack of appropriate, sustainable forest management can lead to a decrease in forest habitat diversity, degraded habitat for many forest species, the loss of habitat for early-successional species, and/or the loss of unique habitats for species that need canopy breaks and multi-aged tree composition to fulfill various life history requirements.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized) (Avg. Score: 3.00)

NJ Specific Threats: 6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.

6.1.1.3 Increased risk of harassment that results in a change in wildlife behavior and/or direct mortality from vehicle strikes.

6.1.1.6 Off-road vehicles can be a mechanism of transference of wildlife diseases and invasive plant species if gear and apparel are not properly sanitized between sites.

7 Natural Systems Modifications

7.1 Fire and Fire Suppression

7.1.1 Increase in Fire Frequency/Intensity (Avg. Score: 3.00)

NJ Specific Threats: 7.1.1.1 Increase in frequency and intensity of wild fires as a result of droughts and heat waves drying out vegetation and litter.

7.1.1.2 Increase in frequency of wild fires as a result of illegal activities.

7.1.1.3 Unnatural fire regimes occurring as a result of military exercises.

7.1.1.4 Lack of diversity in age structure and composition of vegetation due to expansive, frequent fires.

7.1.2 Suppression of Fire Frequency/Intensity (Avg. Score: 3.00)

NJ Specific Threats: 7.1.2.1 Shift in vegetative communities as a result of suppression of natural fires.

7.1.2.2 Lack of diversity in age structure and composition of vegetation due to the suppression of fire.

7.3 Other Ecosystem Modifications

7.3.2 Inappropriate timing of mowing (Avg. Score: 3.00)

NJ Specific Threats: 7.3.2.1 Increased risk of direct mortality and/or reduced productivity of wildlife, as well as reduced use by migrating species.

7.3.4 Lack of natural disturbance patterns or ecosystem functions due to species loss (Avg. Score: 3.00)

NJ Specific Threats: 7.3.4.5 The lack of forest disturbance minimizes the diversity of herbaceous vegetation and other shrubs and trees that need a lot of sunlight to grow.

7.3.5 Poor habitat management (Avg. Score: 3.00)

NJ Specific Threats: 7.3.5.1 Improper or poorly scheduled maintenance of man-made corridors (e.g., roadsides and medians) can cause direct mortality to and may reduce productivity of wildlife.

7.3.5.3 Vegetation clearing removes terrestrial and riparian corridors for animal movement, shelter, and resting areas.

7.3.5.5 Habitat management that alters or removes vegetation without implementing long-term management increases the risk of invasive and exotic plants establishing themselves, outcompeting native vegetation.

7.3.5.6 Habitat management, including that which occurs on public and private lands, that does not consider timing and species' behaviors can result in the direct mortality and/or alteration or loss of habitat.

7.3.5.7 Improperly planned habitat management and/or mitigation efforts along roadsides and within the medians can attract wildlife and increase the risk of vehicle strikes.

7.3.5.12 Lack of diversity in age structure and composition of vegetation due to lack of natural disturbances and/or vegetation management.

7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

7.3.5.18 Lack of funding or competitive market prices to maintain native grasslands for grassland-dependent species causes conversion of fallow or hay fields to other crops or shrublands.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.1.1.1 Displace or outcompete native species for resources.

8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.

8.1.1.3 Invasive, non-native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

8.1.1.4 Invasive, non-native animals increase the risk of predation on native animals and/or herbivory on native vegetation.

8.1.1.5 Invasive, non-native animals and plants increase the risk of introduction and transference of diseases

8.1.1.6 Invasive, non-native plants may create physical barriers for some species.

8.1.4 Invasive non-native terrestrial/wetland animals (Avg. Score: 2.00)

NJ Specific Threats: 8.1.4.1 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.6 Invasive non-native fungal/bacterial diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.1.6.1 The introduction of non-native fungal and bacterial diseases threatens native populations and ecosystems.

8.2 Problematic Native Species/Diseases

8.2.2 Named Species (Avg. Score: 1.00)

NJ Specific Threats: 8.2.2.2 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.4 Problematic Species/Diseases of Unknown Origin

8.4.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.4.1.1 Non-native or poorly understood diseases and parasites could potentially impact native animals.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.3 Agricultural and Forestry Effluents

9.3.2 Soil Erosion and Sedimentation (Avg. Score: 1.00)

NJ Specific Threats: 9.3.2.2 Soil erosion and sedimentation limit the re-establishment of plants needed by terrestrial wildlife as cover and a food base.

9.3.3 Herbicides and Pesticides (Avg. Score: 3.00)

NJ Specific Threats: 9.3.3.1 Pesticides degrade terrestrial and aquatic habitats, especially streams, ponds and wetlands. Aquatic wildlife are particularly sensitive to these contaminants, which can cause developmental and behavioral abnormalities and reproductive failure. Some contaminants may bioaccumulate in predatory fish and birds and disrupt reproduction.

9.3.3.3 Use of pesticides can directly harm non-target species through direct contact and/or by reducing and/or contaminating their food supply.

9.3.3.4 Use of herbicides can destroy beneficial food and nectar plants for insects.

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture (Avg. Score: 3.00)

NJ Specific Threats: 9.3.5.1 Use of pesticides, insecticides, and/or herbicides can directly harm non-target species, such as amphibians and beneficial invertebrates through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5.2 Use of herbicides can destroy beneficial food and nectar plants for insects.

9.3.5.4 Improper use of current insecticides, such as those containing esfenvalerate, prallethrin, or piperonyl butoxide, or past use of pesticides containing chlordane still present in the soils, are toxic to various wildlife species, and can cause injury, mortality, or other effects that impair population viability.

9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.5 Air-Bourne Pollutants

9.5.4 Other (Avg. Score: 1.00)

NJ Specific Threats: 9.5.4.1 Dust and/or airborne sedimentation from construction sites, agricultural operations or related earth disturbances can introduce mineral or organic sediments into adjacent wildlife habitats, degrading their quality and suitability for wildlife short-term and/or long-term.

9.5.6 Herbicides and Pesticides (Avg. Score: 3.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 3.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.6 Phenology Shifting or Alteration

11.6.1 Phenology shifts related to pollination ecology (Avg. Score: 1.00)

NJ Specific Threats: 11.6.1.1 Alters inter-specific relationships of wildlife and vegetation, ultimately leading to detrimental impacts on the ecological system.

11.6.3 Phenology shifts related to species redistribution (Avg. Score: 1.00)

NJ Specific Threats: 11.6.3.1 Shifts in timing of species migration, breeding and hibernation, and available food resources, as a result of wildlife range shifts driven by climate change.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 3.00)

NJ Specific Threats: 12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.2 Lack of up-to-date existing information (Avg. Score: 3.00)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.3 Need to answer research question (Avg. Score: 3.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.4 Need to develop new technique (Avg. Score: 3.00)

NJ Specific Threats: 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 1.00)

NJ Specific Threats: 12.3.0.1 Regulatory habitat protections within state land use regulations are spatially limited to specific geographic areas (e.g., Pinelands, Coastal Area) or geographic features (e.g., wetlands, streams) and so fail to protect critical habitats that exist outside of these regulated areas.

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.9 Prescribed burns implemented by the NJ Forest Fire Service are constrained by State air quality regulations to a timeframe where seasonal weather conditions are less than ideal for effective burning. As a result, the Forest Fire Service is limited in the number of overall prescribed burns it can implement to restore habitat for wildlife.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 1.00)

NJ Specific Threats:

12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.

12.4.0.5 Bureau of Forest Fire Management policy has traditionally implemented prescribed burns on State lands for the sole purpose of public safety (i.e., addressing hazard fuel reduction), missing opportunities to burn in a manner that would additionally manage habitat for ecological diversity.

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 3.00)

NJ Specific Threats:

14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 3.00)

NJ Specific Threats:

14.2.1.1 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various forest management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 1.00)

NJ Specific Threats:

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.5 Secure and promote the protection/restoration of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through incentive programs.

1.2.1.6 Secure and promote the protection/restoration of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.9 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing Forestry Stewardship Programs.

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.12 Create incentives (non-monetary and/or monetary) for land developers to redevelop abandoned areas (e.g., shopping centers, office complexes) to minimize the loss of natural habitats and reduce the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.14 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of herbicides and pesticides, and implementing more ecologically safe strategies when using such products.

1.2.1.15 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of rodenticides, and implementing more ecologically safe strategies when using such products.

1.2.1.16 Create incentives (non-monetary and/or monetary) within State regulations (mitigations requirements or credit, BMP satisfaction, etc.) to promote the use of retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.17 Develop a public-relations oriented certification program for private retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.18 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and land managers to control and reduce the impacts of invasive, native and non-native species in order to increase structural habitat diversity.

1.2.1.19 Create incentives for federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to farmers, woodland landowners, and private landowners to adopt and/or endorse consistent BMPs concerning controlled burns to maintain and/or improve wildlife habitat.

1.2.1.20 Coordinate across government agencies and non-government organizations to create or expand upon tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMP's.

1.2.1.21 Create and/or support market-based programs that subsidize or create branding for products derived sustainably from managed wildlife habitats.

1.2.1.22 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to horse/livestock farm owners and managers to increase structural habitat diversity in and around the farms by managing vegetation for a variety of species, in particular, farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

1.2.1.23 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to provide cost shares and/or plan approvals for management based on management approaches and prescriptions.

1.2.1.24 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners, with habitat of suitable patch size to support breeding grassland-dependent species, to alter the timing of vegetation management to benefit grassland and pollinator species.

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

1.2.1.28 Create incentives to implement dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

2 Direct Management of Natural Resources

2.3 Fire management

2.3.2 Fuel reduction

2.3.2.1 Prevent wildfires by reducing natural fuel (e.g., leaf litter).

2.3.3 Prescribed burning

2.3.3.1 Evaluate different management techniques of prescribed burns that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

2.3.3.2 Conduct prescribed burning in Northern New Jersey forests to maintain and regenerate a mosaic of upland forest habitats.

2.3.3.3 Conduct prescribed burning to improve wildlife habitat.

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.1 Control invasive insect infestations by implementing BMP strategies through biological, chemical and/or mechanical means that will depress, or when appropriate, eradicate populations in a manner that avoids excessive harm to non-target species using BMPs to control infestations and limit their spread based on an inventory of invasive insect distribution and response to outbreaks.

2.8.0.2 Develop, implement, monitor and evaluate pest control/management strategies to reduce the impacts of over-abundant wildlife species (native and/or native, invasive species) on native vegetation and the degradation of habitats supporting SGCN. Over-abundant wildlife species include but are not limited to mute swans, Canada geese, beaver and white-tailed deer.

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.5 Implement biologically safe and appropriate control/management strategies, and where appropriate, eradication strategies to reduce the impacts and/or limit the distribution of invasive and/or non-native plant species within or near aquatic systems using methods that will provide the most protection to the aquatic and riparian ecological system, and minimize disturbance to the soil and wildlife. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.8.0.6 Implement long-term management of invasive and/or non-native plants to help maintain functioning ecological systems and biological diversity, and to enhance travel corridors. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.2 Improve the availability of prey/food resources through terrestrial and aquatic plantings and habitat restoration for SGCN populations, in particular for those populations thought to be limited due wholly or in part to a lack of (or contaminated) food resources, and for migratory species (birds, bats, invertebrates).

2.10.0.3 Restore and/or enhance habitats to benefit urban-associated SGCN.

2.10.0.4 Restore and/or enhance suitable travel corridors connecting conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.8 Protect significant natural and/or unique communities by implementing best management practices when conducting habitat restoration strategies.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.10 Minimize the loss of important habitats (e.g., coastal scrub-shrub and grassy habitats, high and low marsh habitats, etc.) that provide nesting, migrating, and wintering areas for SGCN birds and other coastal and marsh-dependent species through habitat restoration efforts.

2.10.0.11 Restore and/or enhance critical migratory terrestrial and aquatic habitats (e.g., beach, grasslands, forest, scrub-shrub, etc.) for songbirds, raptors, shorebirds, waterfowl, bats and invertebrates through habitat restoration efforts and expand habitat restoration to adjacent private lands to increase the effective size of the habitat.

2.10.0.12 Create and/or maintain scrub-shrub habitats through revegetation efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.15 Restore and/or enhance terrestrial and aquatic habitats proximate to but not adjacent to roads and other transportation corridors for terrestrial-bound SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.10.0.21 Restore and/or enhance understory habitats that suppress invasive species and provide critical resources and enhance sheltering, foraging, and nesting cover for wildlife.

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.11.0.3 Create suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats through vegetation management.

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through vegetation management.

2.11.0.6 Reclaim degraded rare species habitats by conducting vegetation management needed to restore habitat value for the documented/target SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.23 Implement appropriate habitat management actions in areas where natural disturbances, such as wildfire, have been precluded.

2.11.0.24 Conduct vegetation management adjacent to aquatic habitats following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.25 Conduct vegetation management along access roads following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.26 Conduct vegetation management along roadsides and medians, avoiding peak activity periods for wildlife, that enhances wildlife dispersal naturally and safely across roads and similar barriers to/between terrestrial and/or aquatic habitats.

2.11.0.27 Conduct vegetation management for target shrub- or young forest-dependent SGCN following BMPs to minimize the risk of the establishment of invasive and non-native plants.

2.11.0.28 Conduct vegetation management in agricultural areas following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.29 Conduct vegetation management on transportation and service corridors (i.e., rights-of-way) following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.30 Identify and prioritize areas where various management tools (such as increasing salinity through the management of water levels or chemical applications) may be effective in reducing phragmites within and restoring marsh habitat.

2.11.0.31 In areas where vegetative communities are shifting due to fire suppression and controlled burns are not feasible, manage vegetation to improve wildlife habitat.

2.11.0.32 Increase structural habitat diversity around and when feasible, within agricultural landscapes by managing vegetation for a variety of species, in particular, those farms that have removed scrub-shrub habitat and/or fragmented forests, and by implementing ecologically best practices (e.g., no-till farming, maintaining hedgerows, buffer set-asides, etc.).

2.11.0.33 Increase structural habitat diversity by implementing long-term vegetation management to minimize the potential for the establishment of invasive and/or non-native plants that may outcompete native vegetation.

2.11.0.34 Increase structural habitat diversity by managing residential, commercial and recreational areas' landscapes for a variety of species. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.

2.11.0.38 Increase structural habitat diversity in and around horse/livestock farms by managing vegetation for a variety of species, in particular, in and around farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

2.11.0.39 Increase structural habitat diversity in and around solar farms by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.40 Increase structural habitat diversity surrounding areas used for energy, mining, and transportation and service corridors by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides, and avoid managing habitat during the breeding seasons for ground-nesting birds, reptiles, amphibians and small mammals.

2.11.0.41 Increase structural habitat diversity through the implementation of a variety of vegetation management practices such a prescribed burns (either increasing or decreasing their frequency depending on the site and objective), plantings, etc. that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.42 Increase structural habitat diversity within wind farms for terrestrial bound and low-flying species and around wind farms for other wildlife by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.43 Manage forests to increase variation in age structure and composition using BMPs that promote and maintain functioning ecological forest-based systems and biological diversity.

2.11.0.45 Regularly and/or rotationally create young forest habitat in targeted areas to maintain and regenerate a mosaic of upland forest habitats that will benefit shrub- and young forest-dependent species.

2.14 Wildlife disease management

2.14.0 Wildlife disease strategy development and investigation

2.14.0.1 Investigate diseases/pathogens impacting SGCN and/or their habitats.

2.14.0.2 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

2.14.0.3 Protect SGCN from exotic pathogen introduction or incident through implementation of a "rapid response plan"; DFW to give priority attention to these species in planning and/or implementing a response.

2.14.0.4 Conduct long-term monitoring of diseases in vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts.

2.14.0.5 Assess the impacts of diseases on the life cycles of wildlife.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.6 Conduct long-term studies on resident and migratory SGCN to determine if there are changes to the populations' demography (productivity, survival, dispersal) and/or to their critical and/or supporting habitats (i.e., diminishing in value, acreage or connectivity, etc.), in particular changes that would not maintain SGCN at viable levels for species populations. Update data and GIS maps; provide updated information to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.14 Identify areas with invasive, aquatic plants and animals and collect a detailed baseline assessment of the species' status and distribution. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort. Researchers and contractors performing Forest Stewardship Inventories and/or Plans on state lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.0.0.15 Conduct long-term monitoring of areas identified as having invasive, aquatic plants and animals to track the species' status/progress over time with or without the implementation of management strategies. Areas without management strategies should be assessed and prioritized for management/control. Areas where management strategies are being implemented should include an assessment of the management effort and identify/recommend and implement necessary changes to improve its success. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort.

3.0.0.26 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species including objectives and guidance pertaining to and the condition/status of critical and supporting habitats.

3.0.0.27 Evaluate the effectiveness of strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals through research and monitoring. Develop and provide NJ DEP and other appropriate governing agencies/commissions a summary of findings and recommendations to improve such efforts.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.7 Track (via a database that includes a GIS component) and research problematic species and diseases to determine their distribution, impacts on SGCN wildlife/wildlife communities, and develop potential control measures.

3.2.0.8 Implement and conduct long-term monitoring of control measures aimed at minimizing the impacts of problematic species and/or diseases to evaluate the effectiveness of such efforts and to identify and incorporate additional strategies as appropriate.

3.2.0.18 Conduct baseline surveys/inventories to better understand the distribution of fish and invertebrate (including freshwater mussels) populations.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.2 Age, size and sex structure

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.3 Baseline inventory

3.2.3.9 Investigate hazardous environmental issues that may impact grassland invertebrates.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.6 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) that could, through revegetation and/or enhancement efforts, become suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN.

3.3.1.7 Map and prioritize existing and potential areas for early succession forest management. Share the results with state, county and municipal planners.

3.3.1.8 Assess the availability and suitability of forest habitats for SGCN species (particularly reptiles and amphibians, birds, pollinators, and tiger beetles) in southern forests since Superstorm Sandy.

3.3.1.10 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and document fish SGCN habitats by plotting their distributions in GIS and submitting the data to the State for integration into the DEP's Biotics database.

3.3.1.16 Gather "best information" for spatial modeling and update/create a current model/depiction of anticipated habitat shifts from sea-level rise, flooding, etc.

3.3.1.17 Identify and map undeveloped roads and trails in all conserved forests, and create a database of locations. Integrate information regarding potentially sensitive areas.

3.3.1.18 Conduct an assessment using available data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels.

3.3.1.19 Identify and codify legal ORV access areas on state (and if appropriate, other conserved) lands. Provide GIS mapping to the landowner for potential use in directing such recreational activities.

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.2 Monitoring

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.8 Evaluate the effectiveness of current prescribed burning practices on Pinelands dependent species.

3.3.2.10 Evaluate the efficacy and success of different management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.3.2.11 Evaluate and compare the effectiveness of delayed mowing of warm season grass fields versus cool season hay fields to benefit grassland-dependent species.

3.3.2.12 Evaluate and compare the effectiveness of different management techniques (e.g., prescribed burning, mowing, brush-hogging, etc.) for maintaining suitable habitat for grassland-dependent species and species dependent upon early successional habitats.

3.3.2.13 Evaluate the effectiveness of management strategies (e.g., timing restrictions for mowing, cooperative agreements with utility companies for maintenance of rights-of-ways) that maintain and enhance large existing areas of grassland in perpetuity. Focus on habitat patches that can be managed to enhance the total size of suitable grassland habitat and create interspersed early-successional habitat.

3.3.2.15 Investigate the effectiveness of management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.3.2.20 Once a system is developed for reporting and qualifying new locations of invasive species, develop, implement and monitor/evaluate invasive species removal strategies at identified locations. Priority should be given to those areas critical to SGCN and/or contain unique and/or rare plant communities supporting SGCN and/or other fish/wildlife species.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.3 Develop/improve management techniques that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.9 Develop strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.3.16 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.3.19 Work with foresters to develop prescribed burning practices for Pinelands dependent species that increase or maintain habitat quality for these species in the Pinelands.

3.5.3.21 Develop management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.22 Identify (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) and modify management strategies (e.g., timing restrictions for mowing, cooperative agreements with utility companies for maintenance of rights-of-ways), based on research, that maintain and enhance large existing areas of grassland in perpetuity.

3.5.3.24 Based on research, modify management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.5 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

3.5.4.6 Investigate the feasibility of mitigating for the impacts of contaminants to vulnerable wildlife, particularly SGCN. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.5.4.14 Develop and implement agreements, and update existing agreements, with government agencies regarding the protection of critical SGCN habitats (e.g., significant breeding populations of beach nesting birds, colonial waterbird nesting areas, bat colonies, etc.).

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.18 Investigate the effectiveness of survey techniques through selected “ground truthing” and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

3.5.4.21 Develop BMPs to address problematic species and diseases of unknown origin.

4 Education

4.1 Educator/Instructor training

4.1.0 Public education

4.1.0.1 Provide educational resources and training programs to private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

5 Facilities and Areas

5.15 Wildlife Management Areas

5.15.6 Roads

5.15.6.1 Clearly post areas/roads where vehicle access is permitted.

5.15.6.2 Clearly post areas/trails where vehicle access is not permitted.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.7 Secure and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.8 Secure and protect scrub-shrub habitats for SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.8 Promote the protection of scrub-shrub habitats for SGCN through conservation area designations.

6.4 Private lands agreements

6.4.0 Private land agreement strategies

6.4.0.1 Enter into private lands agreements to expand control burns on private lands, in particular those adjacent to conserved lands to improve SGCN habitats.

7 Law Enforcement

7.1 Law enforcement

7.1.3 Sub-national Level

7.1.3.2 Increase the number of law enforcement officers tending to wildlife issues to a reasonable number to sufficiently cover the State and marine waters.

7.1.4 Scale Unspecified

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.19 Implement policies that protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

7.1.4.26 Educate law enforcement personnel that there may be unauthorized research projects taking place and to encourage them to investigate any activities that appear to be harmful to wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.2 Develop a team of personnel from government entities, conservation organizations and other stakeholders engaged in oil/gas spill response for marine and freshwater habitats to develop a feasible plan for oil spill response and/or to amend NJ's current oil spill response plan that clearly outlines each organizations responsibilities and an assessment and location list of available equipment for boom deployment during oil spills.

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.1.0.4 Engage government agencies, conservation partners and other stakeholders in constructive dialogues encouraging them to influence policy change and the creation of incentives through a habitat bill and/or municipal ordinances for backyard habitat.

8.1.0.15 Engage government agencies, conservation partners and other stakeholders in discussions encouraging and supporting the creation of laws and policies requiring vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

8.1.0.16 Engage local governments in discussions regarding the importance of them adopting/passing ordinances which require assessing and addressing secondary impacts (i.e., ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

8.1.0.17 Engage municipalities in constructive dialogue to identify and minimize destruction of areas prioritized for early succession forest management.

8.1.0.18 Engage NJDOT, NJ Transit Authority and other road management entities, wildlife conservation organizations/agencies (e.g., Division of Fish and Wildlife, New Jersey Conservation Foundation, Conserve Wildlife Foundation of NJ), and communities and citizens in discussions regarding the importance of and methods to enhance habitat connectivity, and work together to develop feasible strategies for ensuring that wildlife can disperse naturally and safely across roads and similar barriers to terrestrial and/or aquatic habitats.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.20 Organize a small focal group of government and non-government agencies/organizations responsible for decisions regarding beach/dune management to share and coordinate their goals so that comprehensive planning can attempt to meet all needs.

8.1.0.21 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation human-subsidized and/or overabundant, native species cause to local nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.22 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation invasive species cause to native nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.26 Coordinate across federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to woodland landowners to adopt or endorse consistent best management practices concerning controlled burns to maintain and/or improve forested habitat for wildlife.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.34 Work with the NJ Education Association and Department of Education to design curriculum and outdoor experimental learning opportunities, and provide training to teachers on implementation of these activities.

8.1.0.37 Enlist landowners and NJ citizens in the protection of and survey efforts for SGCN, in particular rare species, by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management and wildlife-related volunteer programs.

8.1.0.38 Engage partners, stakeholders and land managers in constructive dialogue promoting forest stewardship for SGCN that use core forests and forested corridors.

8.1.0.40 Encourage researchers, land managers, naturalists and enthusiasts to follow proper procedures for the coordination and/or permitting of research/management activities involving wildlife and sensitive habitats, and discourage activities that alter vegetation or wetlands, or cause harm or disturbance to wildlife.

8.1.0.42 Engage citizens, wildlife observers and photographers through discussions and distributable information regarding the importance of and encouraging implementing responsible and ethical behavior when observing wildlife by developing an alliance of wildlife photographers and widely circulating recommendations on how to reduce impact.

8.1.0.44 Engage conservation partners, stakeholders, government agencies and other land stewards in constructive dialogues encouraging their inclusion of controlled burns in forest and other stewardship plans.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.1.0.48 Form cooperative partnerships with transportation and shipment agencies and companies to facilitate habitat creation and enhancement away from and outside of project areas and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.2 Recruitment and retention activities

8.2.3 For wildlife watching

8.2.3.1 Develop and implement nature-focused tourism opportunities including wildlife viewing sites, interpretive signage highlighting unique ecosystems/habitats, and wildlife-related recreational opportunities that do not negatively impact SGCN or their habitats.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.7 Develop and provide (or otherwise make publicly available) educational programs and/or materials that describe the negative impacts of off-road vehicles and watercraft use in and adjacent to critical SGCN habitats, and the importance of confining such activities to more appropriate locations and/or seasons.

8.3.0.8 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate recreationists and encourage landowners to eliminate garbage in the vicinity of suitable wildlife habitat, in particular SGCN habitat. Information should include the detrimental impacts garbage may have on various wildlife species.

8.3.0.9 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners and land managers to include only native plants in landscaping and restoration projects. Provide information to assist them in detecting problematic establishment of invasive, non-indigenous plants.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.11 Develop and provide (or otherwise make publicly available) educational programs and/or materials to the public, wildlife-related professionals, foresters, etc., that describe the value of species that are often feared (e.g., snakes, bats, spiders, Allegheny woodrat) and/or deemed a "nuisance" (e.g., squirrel, deer, snapping turtle), and therefore, persecuted by people. Include information on tolerance, proper identification, eviction from human dwellings, how to minimize the animal's presence on the property, and/or how to live in harmony with the animal.

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.24 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

8.3.0.25 Develop educational outreach programs for landowners, nurseries and the general public regarding the negative impacts of invasive and non-native plants on our natural communities.

8.3.0.26 Develop educational outreach programs for private and public landowners and land managers regarding the importance of and how to manage core forests and forested corridors in a way that will be beneficial for SGCN, particularly endangered, threatened and special concern species.

8.3.0.27 Develop educational outreach programs for public and private landowners and land managers regarding the importance of structural habitat diversity, methods to increase diversity, and/or incentive programs available to increase habitat diversity.

8.3.0.28 Develop educational outreach programs for public and private landowners and land managers regarding the importance of managing grasslands for grassland-dependent species, methods of management, and/or incentive programs available.

8.3.0.30 Develop educational outreach programs for private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.5 Develop a plan that directs the creation or expansion of energy or utility rights-of-way in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.6 Develop a plan that directs the creation or expansion of roads and railroads or the re-establishment of abandoned railroads within and adjacent to critical forested habitats in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.8 Develop a plan that focuses on strategies for oil pipelines to avoid sensitive habitats that would be highly impacted by oil spills.

9.1.0.9 Develop a plan that focuses on strategies to minimize the creation of renewable energy farms (e.g., solar, wind) and related infrastructures within and their impacts on forested habitats and the wildlife community.

9.1.0.10 Develop a plan that focuses on strategies to minimize the impacts of mining on critical forested habitats.

9.1.0.11 Develop a plan that focuses on strategies to minimize the impacts of power plants on critical forested habitats and the wildlife community.

9.1.0.13 Develop a plan to minimize agriculture that would result in groundwater withdrawal in critical forested areas.

9.1.0.15 Develop a plan to minimize fragmentation of terrestrial and aquatic habitats by roads.

9.1.0.16 Develop a plan to minimize new lawnscapes and preserve natural vegetation within and adjacent to critical forest areas.

9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

9.1.0.21 Develop a plan to minimize the use of any-sized dam in critical forested areas.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.2 Organizational strategic and CMS planning

9.2.1 Organizational strategic and operational planning

9.2.1.1 Identify and codify legal ORV access areas on state lands.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.5 Develop response plans to address disease outbreaks within wildlife populations, in particular SGCN.

9.3.1.7 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.10 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.15 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.1.16 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3 Habitat management planning

9.3.3.5 Develop a management plan using forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

9.3.3.7 Develop a management plan to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

9.3.3.8 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.3.13 Develop a management plan that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas and prevents or ameliorates near-term impacts of climate change throughout the State, but in particular within the coastal and Delaware Bay areas.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.16 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.3.17 Develop a management plan for prescribed burning that will benefit Pinelands dependent species and increase or maintain habitat quality for these species in the Pinelands.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.21 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.3.26 Develop a management plan for parcels of suitable size to be managed for native herbaceous plant species that support breeding grassland dependent species.

9.3.3.28 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.3.29 Develop habitat management plans aimed at reducing or eliminating negative impacts of ORVs.

9.3.3.32 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3.34 Include controlled burn prescriptions in forest and stewardship plans to improve wildlife habitat.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.12 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed solar farm projects to reduce habitat fragmentation and minimize impacts on wildlife.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.2 Provide technical support to public and private landowners and land managers for controlling invasive, native and non-native plant species in order to increase structural habitat diversity.

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.7 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on the importance of maintaining habitat connectivity, minimizing fragmentation, and the use of CHANJ products to help them target areas for such planning.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.11 Provide educational resources, training programs, and on-the-ground guidance to private and public landowners and land managers on the benefits of and for creating young forest and early succession habitat for SGCN.

11.2.0.12 Provide educational resources and technical support to public landowners and land managers for managing grasslands for grassland-dependent species.

11.2.0.15 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and landowners about the importance of retaining and in an effort to protect, create, enhance and/or restore vegetation along aquatic habitats.

11.2.0.17 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of vernal pools and the protection, enhancement and/or restoration of biologically appropriate buffers.

11.2.0.19 Provide educational resources and technical support to public and private landowners and land managers to promote the protection and/or enhancement of scrub-shrub habitats for SGCN.

11.2.0.22 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

11.2.0.23 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to SGCN habitats to promote the protection and/or enhancement of those adjacent habitats to increase the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and that connect conserved SGCN habitats.

11.2.0.24 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers on how to manage vegetated roadside areas (e.g., mowing, brush-hogging, etc.) on a schedule that avoids peak activity periods for wildlife and therefore, minimizes harm.

11.2.0.25 Provide educational resources, training programs, and on-the-ground guidance to resource managers regarding the assessment of and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) related to residential and commercial development.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.1 Engage partners and stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.3 Provide educational resources, training programs, and on-the-ground guidance to DOD to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop and implement forest management and other practices that minimize disturbances to SGCN (i.e., beyond their federal requirements).

11.2.1.5 Provide educational resources, training programs, and on-the-ground guidance to municipalities, state and federal agency resource managers on tasks such as writing and integrating Beach Management Plans into other management documents.

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

11.2.2 With private landowners

11.2.2.1 Provide technical support to farming operations and woodland landowners on ways to decrease clean farming (edge-to-edge) practices and create ecotones to benefit bobwhite and other species dependent on early successional habitat.

100 Law and Policy

100. Legislation

100.1.3 Sub-national Level

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.4 County and Local

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.3 Expand the acreages and enhance the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN through local ordinances.

100.1.4.12 Secure scrub-shrub habitats for SGCN through local ordinances.

100.1.4.14 Adopt/pass local ordinances which require assessing and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100.1.5.5 Develop legislation to provide financial support for the New Jersey Invasive Species Strike Team.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.5 Develop policies that will promote improved and secure habitat connections between conserved SGCN habitats.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.12 Develop policies that promote the preservation and protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.15 Develop policies that promote protecting and restoring scrub-shrub habitats to benefit shrub-dependent SGCN.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.23 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.31 Create or expand tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMPs.

100.3.0.32 Coordinate regulations across agencies to maximize availability of and enrollment in existing Forestry Stewardship Programs (e.g., "Woodland Stewards", Farm Bill, partners, etc.) to maintain and/or improve forest habitat.

100.3.0.38 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.3.0.39 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.3.0.40 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.45 Increase the controlled burn season to focus on restoring vegetative communities.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.48 Propose new State law or regulation mandating that a State-level "development impact fee" be assessed on all new development approved by municipalities (via the Municipal Land Use Law processes), and dedicate such monies to the development and implementation of regional Habitat Conservation Plans (or existing plans/programs serving the same regional function).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.53 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded rights-of-way corridors associated with energy transport/transmission.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.65 Develop regulations that when implemented will protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100.3.0.73 Develop regulations that would exempt the conversion of lawns to native vegetation (beneficial to wildlife) from local lawn ordinances.

100.3.2 State Land Acquisition Programs

100.3.2.1 Increase opportunities for habitat restoration by making any necessary policy changes to state, federal and local land acquisition programs (e.g., Green Acres, Blue Acres, etc.) to allow for acquisition within abandoned or failing bay shore communities, including mechanisms to relocate displaced people and infrastructure.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.2 Create a policy that requires the NJ DEP to incorporate scientific information regarding climate change and sea level rise (e.g., predictions, habitat management/acquisition efforts to enhance resilience to inundation) on their websites and to work with other government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

100.4.0.3 Develop policies for mandatory buffer strips on preserved farmlands and state-owned agricultural lands.

100.4.0.8 Develop a white paper addressing the impacts that existing, new or expanded rights-of-way have upon wildlife, wildlife habitats and habitat connectivity.

100.4.0.10 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.4.0.11 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.4.0.12 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.4.0.13 Develop policies for different circumstances (e.g., roadsides and medians, riparian, aquatic and terrestrial habitats) that outline appropriate habitat/vegetation management strategies and schedules to minimize risks to and benefit wildlife.

100.4.0.14 Develop policies to facilitate agreements between eligible entities to manage appropriate conserved lands for grassland-dependent species, and to have access to/obtain restoration funds.

100.4.0.16 Develop policies to implement habitat management strategies that will increase the structural diversity surrounding areas used for energy, mining, and transportation and service corridors which include but are not limited to the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-

100.4.0.17 Develop policies to implement habitat management strategies, including prescribed burns, that will increase the structural diversity on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies to control and reduce the impacts of invasive, non-native species in order to increase structural habitat diversity.

100.4.0.18 Develop policies to minimize the extent of infrastructure associated with energy and service corridors or areas (e.g., wind and solar farms, pipelines, utility lines) and that require the implementation of habitat management strategies that will increase the structural diversity in the area including (e.g., the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides).

100.4.0.19 Develop regulations that will minimize the creation of new barriers, remove or replace current barriers with appropriately-sized systems to accommodate wildlife dispersal, and to minimize road widening and traffic volume increases within critical wildlife habitat areas.

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.24 Develop policies to provide financial support for the New Jersey Invasive Species Strike Team.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Georgia Satyr

Focal species that comprise this Conservation Target:

Georgia Satyr

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:
- 1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.1.1.2 Loss, alteration and/or degradation of habitat.
- 1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:
- 1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.2.1.2 Loss, alteration and/or degradation of habitat.
- 1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:
- 1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.3.1.2 Loss, alteration and/or degradation of habitat.
- 1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture (Avg. Score: 3.00)

NJ Specific Threats:
- 2.1.1.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.2 Small-holder Farming (Avg. Score: 1.00)

NJ Specific Threats:
- 2.1.2.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.
- 2.1.2.2 Fragments terrestrial and aquatic habitats.

2.1.3 Agro-industry (Avg. Score: 3.00)

NJ Specific Threats: 2.1.3.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.3.2 Fragments terrestrial and aquatic habitats.

2.1.3.5 Loss of ecotones by implementing clean farming (edge-to-edge) practices degrades habitat for early successional wildlife.

2.2 Wood and Pulp Plantations

2.2.1 Small Holder (Avg. Score: 1.00)

NJ Specific Threats: 2.2.1.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.2.2 Agro-industry Plantations (Avg. Score: 1.00)

NJ Specific Threats: 2.2.2.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.3 Livestock Farming and Ranching

2.3.2 Small-holder Grazing (Avg. Score: 1.00)

NJ Specific Threats: 2.3.2.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.2.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

2.3.2.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.2.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

2.3.3 Agro-industry Grazing (Avg. Score: 3.00)

NJ Specific Threats: 2.3.3.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.3.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

2.3.3.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.3.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

3 Energy Production and Mining

3.2 Mining and Quarrying

3.2.2 Surface Mining - Rock Quarry (and sand quarries) (Avg. Score: 1.00)

NJ Specific Threats: 3.2.2.1 Fragments terrestrial and aquatic habitats.

3.2.2.2 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

3.3 Renewable Energy

3.3.2 Solar Power (Avg. Score: 1.00)

NJ Specific Threats: 3.3.2.2 Loss, alteration and/or degradation of habitat.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads (Avg. Score: 1.00)

NJ Specific Threats: 4.2.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species, inhibiting dispersal of non-volant animals, reducing gene flow, and creating barriers to fish when service line-associated roads cross streams (e.g., bridges, culverts, fords, etc.).

4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

4.2.2 Management of rights-of-way or communication tower facilities and/or their associated access roads (Avg. Score: 3.00)

NJ Specific Threats: 4.2.2.1 Improper or poorly scheduled vegetation management can cause direct mortality to and may reduce productivity of wildlife.

5 Biological Resource Use

5.1 Hunting and Collecting Terrestrial Animals

5.1.1 Intentional Use (Avg. Score: 1.00)

NJ Specific Threats: 5.1.1.1 Illegal collection of wildlife can have detrimental impacts on populations.

5.2 Gathering Terrestrial Plants

5.2.3 Control (Avg. Score: 2.00)

NJ Specific Threats: 5.2.3.1 Alteration or control of undesirable plants or plant communities can destroy important food and nectar plants for native insects and animals.

5.3 Logging and Wood Harvesting

5.3.1 Intentional Use (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.1.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.1.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.1.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.1.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.1.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.1.6 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices in Atlantic White Cedar stands may destroy a unique wildlife wetland habitat that is difficult, and takes time, to restore.

5.3.2 Intentional Use (large scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.2.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.2.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.2.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.2.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.2.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.2.6 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices in Atlantic White Cedar stands may destroy a unique wildlife wetland habitat that is difficult, and takes time, to restore.

5.3.3 Unintentional effects (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.3.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4 Unintentional effects (large scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.4.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4.5 Lack of appropriate, sustainable forest management can lead to a decrease in forest habitat diversity, degraded habitat for many forest species, the loss of habitat for early-successional species, and/or the loss of unique habitats for species that need canopy breaks and multi-aged tree composition to fulfill various life history requirements.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized) (Avg. Score: 3.00)

NJ Specific Threats: 6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.

6.1.1.3 Increased risk of harassment that results in a change in wildlife behavior and/or direct mortality from vehicle strikes.

6.1.1.6 Off-road vehicles can be a mechanism of transference of wildlife diseases and invasive plant species if gear and apparel are not properly sanitized between sites.

7 Natural Systems Modifications

7.1 Fire and Fire Suppression

7.1.1 Increase in Fire Frequency/Intensity (Avg. Score: 3.00)

NJ Specific Threats: 7.1.1.1 Increase in frequency and intensity of wild fires as a result of droughts and heat waves drying out vegetation and litter.

7.1.1.2 Increase in frequency of wild fires as a result of illegal activities.

7.1.1.3 Unnatural fire regimes occurring as a result of military exercises.

7.1.1.4 Lack of diversity in age structure and composition of vegetation due to expansive, frequent fires.

7.1.2 Suppression of Fire Frequency/Intensity (Avg. Score: 3.00)

NJ Specific Threats: 7.1.2.1 Shift in vegetative communities as a result of suppression of natural fires.

7.1.2.2 Lack of diversity in age structure and composition of vegetation due to the suppression of fire.

7.3 Other Ecosystem Modifications

7.3.2 Inappropriate timing of mowing (Avg. Score: 3.00)

NJ Specific Threats: 7.3.2.1 Increased risk of direct mortality and/or reduced productivity of wildlife, as well as reduced use by migrating species.

7.3.4 Lack of natural disturbance patterns or ecosystem functions due to species loss (Avg. Score: 3.00)

NJ Specific Threats: 7.3.4.5 The lack of forest disturbance minimizes the diversity of herbaceous vegetation and other shrubs and trees that need a lot of sunlight to grow.

7.3.5 Poor habitat management (Avg. Score: 3.00)

NJ Specific Threats: 7.3.5.1 Improper or poorly scheduled maintenance of man-made corridors (e.g., roadsides and medians) can cause direct mortality to and may reduce productivity of wildlife.

7.3.5.3 Vegetation clearing removes terrestrial and riparian corridors for animal movement, shelter, and resting areas.

7.3.5.5 Habitat management that alters or removes vegetation without implementing long-term management increases the risk of invasive and exotic plants establishing themselves, outcompeting native vegetation.

7.3.5.6 Habitat management, including that which occurs on public and private lands, that does not consider timing and species' behaviors can result in the direct mortality and/or alteration or loss of habitat.

7.3.5.7 Improperly planned habitat management and/or mitigation efforts along roadsides and within the medians can attract wildlife and increase the risk of vehicle strikes.

7.3.5.12 Lack of diversity in age structure and composition of vegetation due to lack of natural disturbances and/or vegetation management.

7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.1.1.1 Displace or outcompete native species for resources.

8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.

8.1.1.3 Invasive, non-native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

8.1.1.4 Invasive, non-native animals increase the risk of predation on native animals and/or herbivory on native vegetation.

8.1.1.5 Invasive, non-native animals and plants increase the risk of introduction and transference of diseases

8.1.1.6 Invasive, non-native plants may create physical barriers for some species.

8.1.4 Invasive non-native terrestrial/wetland animals (Avg. Score: 2.00)

NJ Specific Threats: 8.1.4.1 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.6 Invasive non-native fungal/bacterial diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.1.6.1 The introduction of non-native fungal and bacterial diseases threatens native populations and ecosystems.

8.2 Problematic Native Species/Diseases

8.2.2 Named Species (Avg. Score: 1.00)

NJ Specific Threats: 8.2.2.2 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.4 Problematic Species/Diseases of Unknown Origin

8.4.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.4.1.1 Non-native or poorly understood diseases and parasites could potentially impact native animals.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.3 Agricultural and Forestry Effluents

9.3.2 Soil Erosion and Sedimentation (Avg. Score: 1.00)

NJ Specific Threats: 9.3.2.2 Soil erosion and sedimentation limit the re-establishment of plants needed by terrestrial wildlife as cover and a food base.

9.3.3 Herbicides and Pesticides (Avg. Score: 3.00)

NJ Specific Threats: 9.3.3.1 Pesticides degrade terrestrial and aquatic habitats, especially streams, ponds and wetlands. Aquatic wildlife are particularly sensitive to these contaminants, which can cause developmental and behavioral abnormalities and reproductive failure. Some contaminants may bioaccumulate in predatory fish and birds and disrupt reproduction.

9.3.3.3 Use of pesticides can directly harm non-target species through direct contact and/or by reducing and/or contaminating their food supply.

9.3.3.4 Use of herbicides can destroy beneficial food and nectar plants for insects.

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture (Avg. Score: 3.00)

NJ Specific Threats: 9.3.5.1 Use of pesticides, insecticides, and/or herbicides can directly harm non-target species, such as amphibians and beneficial invertebrates through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5.2 Use of herbicides can destroy beneficial food and nectar plants for insects.

9.3.5.4 Improper use of current insecticides, such as those containing esfenvalerate, prallethrin, or piperonyl butoxide, or past use of pesticides containing chlordane still present in the soils, are toxic to various wildlife species, and can cause injury, mortality, or other effects that impair population viability.

9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.5 Air-Bourne Pollutants

9.5.4 Other (Avg. Score: 1.00)

NJ Specific Threats: 9.5.4.1 Dust and/or airborne sedimentation from construction sites, agricultural operations or related earth disturbances can introduce mineral or organic sediments into adjacent wildlife habitats, degrading their quality and suitability for wildlife short-term and/or long-term.

9.5.6 Herbicides and Pesticides (Avg. Score: 3.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 3.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.6 Phenology Shifting or Alteration

11.6.1 Phenology shifts related to pollination ecology (Avg. Score: 1.00)

NJ Specific Threats: 11.6.1.1 Alters inter-specific relationships of wildlife and vegetation, ultimately leading to detrimental impacts on the ecological system.

11.6.3 Phenology shifts related to species redistribution (Avg. Score: 1.00)

NJ Specific Threats: 11.6.3.1 Shifts in timing of species migration, breeding and hibernation, and available food resources, as a result of wildlife range shifts driven by climate change.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 3.00)

NJ Specific Threats: 12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.2 Lack of up-to-date existing information (Avg. Score: 3.00)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.3 Need to answer research question (Avg. Score: 3.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.4 Need to develop new technique (Avg. Score: 3.00)

NJ Specific Threats: 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 1.00)

NJ Specific Threats: 12.3.0.1 Regulatory habitat protections within state land use regulations are spatially limited to specific geographic areas (e.g., Pinelands, Coastal Area) or geographic features (e.g., wetlands, streams) and so fail to protect critical habitats that exist outside of these regulated areas.

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.9 Prescribed burns implemented by the NJ Forest Fire Service are constrained by State air quality regulations to a timeframe where seasonal weather conditions are less than ideal for effective burning. As a result, the Forest Fire Service is limited in the number of overall prescribed burns it can implement to restore habitat for wildlife.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 1.00)

NJ Specific Threats:
- 12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.
- 12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.
- 12.4.0.5 Bureau of Forest Fire Management policy has traditionally implemented prescribed burns on State lands for the sole purpose of public safety (i.e., addressing hazard fuel reduction), missing opportunities to burn in a manner that would additionally manage habitat for ecological diversity.
- 12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 3.00)

NJ Specific Threats:
- 14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.
- 14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.
- 14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 3.00)

NJ Specific Threats:
- 14.2.1.1 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various forest management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 1.00)

NJ Specific Threats:
- 15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

- 1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.5 Secure and promote the protection/restoration of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through incentive programs.

1.2.1.6 Secure and promote the protection/restoration of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.9 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing Forestry Stewardship Programs.

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.12 Create incentives (non-monetary and/or monetary) for land developers to redevelop abandoned areas (e.g., shopping centers, office complexes) to minimize the loss of natural habitats and reduce the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.14 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of herbicides and pesticides, and implementing more ecologically safe strategies when using such products.

1.2.1.15 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of rodenticides, and implementing more ecologically safe strategies when using such products.

1.2.1.16 Create incentives (non-monetary and/or monetary) within State regulations (mitigations requirements or credit, BMP satisfaction, etc.) to promote the use of retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.17 Develop a public-relations oriented certification program for private retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.18 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and land managers to control and reduce the impacts of invasive, native and non-native species in order to increase structural habitat diversity.

1.2.1.19 Create incentives for federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to farmers, woodland landowners, and private landowners to adopt and/or endorse consistent BMPs concerning controlled burns to maintain and/or improve wildlife habitat.

1.2.1.20 Coordinate across government agencies and non-government organizations to create or expand upon tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMP's.

1.2.1.21 Create and/or support market-based programs that subsidize or create branding for products derived sustainably from managed wildlife habitats.

1.2.1.22 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to horse/livestock farm owners and managers to increase structural habitat diversity in and around the farms by managing vegetation for a variety of species, in particular, farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

1.2.1.23 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to provide cost shares and/or plan approvals for management based on management approaches and prescriptions.

1.2.1.24 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners, with habitat of suitable patch size to support breeding grassland-dependent species, to alter the timing of vegetation management to benefit grassland and pollinator species.

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

1.2.1.28 Create incentives to implement dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

2 Direct Management of Natural Resources

2.3 Fire management

2.3.2 Fuel reduction

2.3.2.1 Prevent wildfires by reducing natural fuel (e.g., leaf litter).

2.3.3 Prescribed burning

2.3.3.1 Evaluate different management techniques of prescribed burns that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

2.3.3.2 Conduct prescribed burning in Northern New Jersey forests to maintain and regenerate a mosaic of upland forest habitats.

2.3.3.3 Conduct prescribed burning to improve wildlife habitat.

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.1 Control invasive insect infestations by implementing BMP strategies through biological, chemical and/or mechanical means that will depress, or when appropriate, eradicate populations in a manner that avoids excessive harm to non-target species using BMPs to control infestations and limit their spread based on an inventory of invasive insect distribution and response to outbreaks.

2.8.0.2 Develop, implement, monitor and evaluate pest control/management strategies to reduce the impacts of over-abundant wildlife species (native and/or native, invasive species) on native vegetation and the degradation of habitats supporting SGCN. Over-abundant wildlife species include but are not limited to mute swans, Canada geese, beaver and white-tailed deer.

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.5 Implement biologically safe and appropriate control/management strategies, and where appropriate, eradication strategies to reduce the impacts and/or limit the distribution of invasive and/or non-native plant species within or near aquatic systems using methods that will provide the most protection to the aquatic and riparian ecological system, and minimize disturbance to the soil and wildlife. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.8.0.6 Implement long-term management of invasive and/or non-native plants to help maintain functioning ecological systems and biological diversity, and to enhance travel corridors. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.2 Improve the availability of prey/food resources through terrestrial and aquatic plantings and habitat restoration for SGCN populations, in particular for those populations thought to be limited due wholly or in part to a lack of (or contaminated) food resources, and for migratory species (birds, bats, invertebrates).

2.10.0.3 Restore and/or enhance habitats to benefit urban-associated SGCN.

2.10.0.4 Restore and/or enhance suitable travel corridors connecting conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.8 Protect significant natural and/or unique communities by implementing best management practices when conducting habitat restoration strategies.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.10 Minimize the loss of important habitats (e.g., coastal scrub-shrub and grassy habitats, high and low marsh habitats, etc.) that provide nesting, migrating, and wintering areas for SGCN birds and other coastal and marsh-dependent species through habitat restoration efforts.

2.10.0.11 Restore and/or enhance critical migratory terrestrial and aquatic habitats (e.g., beach, grasslands, forest, scrub-shrub, etc.) for songbirds, raptors, shorebirds, waterfowl, bats and invertebrates through habitat restoration efforts and expand habitat restoration to adjacent private lands to increase the effective size of the habitat.

2.10.0.12 Create and/or maintain scrub-shrub habitats through revegetation efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.15 Restore and/or enhance terrestrial and aquatic habitats proximate to but not adjacent to roads and other transportation corridors for terrestrial-bound SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.10.0.21 Restore and/or enhance understory habitats that suppress invasive species and provide critical resources and enhance sheltering, foraging, and nesting cover for wildlife.

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.11.0.3 Create suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats through vegetation management.

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through vegetation management.

2.11.0.6 Reclaim degraded rare species habitats by conducting vegetation management needed to restore habitat value for the documented/target SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.23 Implement appropriate habitat management actions in areas where natural disturbances, such as wildfire, have been precluded.

2.11.0.24 Conduct vegetation management adjacent to aquatic habitats following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.25 Conduct vegetation management along access roads following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.26 Conduct vegetation management along roadsides and medians, avoiding peak activity periods for wildlife, that enhances wildlife dispersal naturally and safely across roads and similar barriers to/between terrestrial and/or aquatic habitats.

2.11.0.27 Conduct vegetation management for target shrub- or young forest-dependent SGCN following BMPs to minimize the risk of the establishment of invasive and non-native plants.

2.11.0.28 Conduct vegetation management in agricultural areas following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.29 Conduct vegetation management on transportation and service corridors (i.e., rights-of-way) following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.30 Identify and prioritize areas where various management tools (such as increasing salinity through the management of water levels or chemical applications) may be effective in reducing phragmites within and restoring marsh habitat.

2.11.0.31 In areas where vegetative communities are shifting due to fire suppression and controlled burns are not feasible, manage vegetation to improve wildlife habitat.

2.11.0.32 Increase structural habitat diversity around and when feasible, within agricultural landscapes by managing vegetation for a variety of species, in particular, those farms that have removed scrub-shrub habitat and/or fragmented forests, and by implementing ecologically best practices (e.g., no-till farming, maintaining hedgerows, buffer set-asides, etc.).

2.11.0.33 Increase structural habitat diversity by implementing long-term vegetation management to minimize the potential for the establishment of invasive and/or non-native plants that may outcompete native vegetation.

2.11.0.34 Increase structural habitat diversity by managing residential, commercial and recreational areas' landscapes for a variety of species. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.

2.11.0.38 Increase structural habitat diversity in and around horse/livestock farms by managing vegetation for a variety of species, in particular, in and around farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

2.11.0.39 Increase structural habitat diversity in and around solar farms by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.40 Increase structural habitat diversity surrounding areas used for energy, mining, and transportation and service corridors by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides, and avoid managing habitat during the breeding seasons for ground-nesting birds, reptiles, amphibians and small mammals.

2.11.0.41 Increase structural habitat diversity through the implementation of a variety of vegetation management practices such a prescribed burns (either increasing or decreasing their frequency depending on the site and objective), plantings, etc. that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.42 Increase structural habitat diversity within wind farms for terrestrial bound and low-flying species and around wind farms for other wildlife by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.43 Manage forests to increase variation in age structure and composition using BMPs that promote and maintain functioning ecological forest-based systems and biological diversity.

2.11.0.45 Regularly and/or rotationally create young forest habitat in targeted areas to maintain and regenerate a mosaic of upland forest habitats that will benefit shrub- and young forest-dependent species.

2.14 Wildlife disease management

2.14.0 Wildlife disease strategy development and investigation

2.14.0.1 Investigate diseases/pathogens impacting SGCN and/or their habitats.

2.14.0.2 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

2.14.0.3 Protect SGCN from exotic pathogen introduction or incident through implementation of a "rapid response plan"; DFW to give priority attention to these species in planning and/or implementing a response.

2.14.0.4 Conduct long-term monitoring of diseases in vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts.

2.14.0.5 Assess the impacts of diseases on the life cycles of wildlife.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.14 Identify areas with invasive, aquatic plants and animals and collect a detailed baseline assessment of the species' status and distribution. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort. Researchers and contractors performing Forest Stewardship Inventories and/or Plans on state lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.0.0.15 Conduct long-term monitoring of areas identified as having invasive, aquatic plants and animals to track the species' status/progress over time with or without the implementation of management strategies. Areas without management strategies should be assessed and prioritized for management/control. Areas where management strategies are being implemented should include an assessment of the management effort and identify/recommend and implement necessary changes to improve its success. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort.

3.0.0.26 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species including objectives and guidance pertaining to and the condition/status of critical and supporting habitats.

3.0.0.27 Evaluate the effectiveness of strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals through research and monitoring. Develop and provide NJ DEP and other appropriate governing agencies/commissions a summary of findings and recommendations to improve such efforts.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.7 Track (via a database that includes a GIS component) and research problematic species and diseases to determine their distribution, impacts on SGCN wildlife/wildlife communities, and develop potential control measures.

3.2.0.8 Implement and conduct long-term monitoring of control measures aimed at minimizing the impacts of problematic species and/or diseases to evaluate the effectiveness of such efforts and to identify and incorporate additional strategies as appropriate.

3.2.0.18 Conduct baseline surveys/inventories to better understand the distribution of fish and invertebrate (including freshwater mussels) populations.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.2 Age, size and sex structure

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.3 Baseline inventory

3.2.3.9 Investigate hazardous environmental issues that may impact grassland invertebrates.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.6 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) that could, through revegetation and/or enhancement efforts, become suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN.

3.3.1.7 Map and prioritize existing and potential areas for early succession forest management. Share the results with state, county and municipal planners.

3.3.1.8 Assess the availability and suitability of forest habitats for SGCN species (particularly reptiles and amphibians, birds, pollinators, and tiger beetles) in southern forests since Superstorm Sandy.

3.3.1.10 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and document fish SGCN habitats by plotting their distributions in GIS and submitting the data to the State for integration into the DEP's Biotics database.

3.3.1.16 Gather "best information" for spatial modeling and update/create a current model/depiction of anticipated habitat shifts from sea-level rise, flooding, etc.

3.3.1.17 Identify and map undeveloped roads and trails in all conserved forests, and create a database of locations. Integrate information regarding potentially sensitive areas.

3.3.1.18 Conduct an assessment using available data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels.

3.3.1.19 Identify and codify legal ORV access areas on state (and if appropriate, other conserved) lands. Provide GIS mapping to the landowner for potential use in directing such recreational activities.

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.2 Monitoring

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.8 Evaluate the effectiveness of current prescribed burning practices on Pinelands dependent species.

3.3.2.10 Evaluate the efficacy and success of different management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.3.2.11 Evaluate and compare the effectiveness of delayed mowing of warm season grass fields versus cool season hay fields to benefit grassland-dependent species.

3.3.2.12 Evaluate and compare the effectiveness of different management techniques (e.g., prescribed burning, mowing, brush-hogging, etc.) for maintaining suitable habitat for grassland-dependent species and species dependent upon early successional habitats.

3.3.2.13 Evaluate the effectiveness of management strategies (e.g., timing restrictions for mowing, cooperative agreements with utility companies for maintenance of rights-of-ways) that maintain and enhance large existing areas of grassland in perpetuity. Focus on habitat patches that can be managed to enhance the total size of suitable grassland habitat and create interspersed early-successional habitat.

3.3.2.15 Investigate the effectiveness of management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.3.2.20 Once a system is developed for reporting and qualifying new locations of invasive species, develop, implement and monitor/evaluate invasive species removal strategies at identified locations. Priority should be given to those areas critical to SGCN and/or contain unique and/or rare plant communities supporting SGCN and/or other fish/wildlife species.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.3 Develop/improve management techniques that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.9 Develop strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.3.16 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.3.19 Work with foresters to develop prescribed burning practices for Pinelands dependent species that increase or maintain habitat quality for these species in the Pinelands.

3.5.3.21 Develop management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.24 Based on research, modify management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.5 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

3.5.4.6 Investigate the feasibility of mitigating for the impacts of contaminants to vulnerable wildlife, particularly SGCN. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.5.4.14 Develop and implement agreements, and update existing agreements, with government agencies regarding the protection of critical SGCN habitats (e.g., significant breeding populations of beach nesting birds, colonial waterbird nesting areas, bat colonies, etc.).

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.18 Investigate the effectiveness of survey techniques through selected “ground truthing” and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

3.5.4.21 Develop BMPs to address problematic species and diseases of unknown origin.

4 Education

4.1 Educator/Instructor training

4.1.0 Public education

4.1.0.1 Provide educational resources and training programs to private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

5 Facilities and Areas

5.15 Wildlife Management Areas

5.15.6 Roads

5.15.6.1 Clearly post areas/roads where vehicle access is permitted.

5.15.6.2 Clearly post areas/trails where vehicle access is not permitted.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.7 Secure and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.8 Secure and protect scrub-shrub habitats for SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.8 Promote the protection of scrub-shrub habitats for SGCN through conservation area designations.

6.4 Private lands agreements

6.4.0 Private land agreement strategies

6.4.0.1 Enter into private lands agreements to expand control burns on private lands, in particular those adjacent to conserved lands to improve SGCN habitats.

7 Law Enforcement

7.1 Law enforcement

7.1.3 Sub-national Level

7.1.3.2 Increase the number of law enforcement officers tending to wildlife issues to a reasonable number to sufficiently cover the State and marine waters.

7.1.4 Scale Unspecified

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.26 Educate law enforcement personnel that there may be unauthorized research projects taking place and to encourage them to investigate any activities that appear to be harmful to wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.2 Develop a team of personnel from government entities, conservation organizations and other stakeholders engaged in oil/gas spill response for marine and freshwater habitats to develop a feasible plan for oil spill response and/or to amend NJ's current oil spill response plan that clearly outlines each organizations responsibilities and an assessment and location list of available equipment for boom deployment during oil spills.

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.1.0.4 Engage government agencies, conservation partners and other stakeholders in constructive dialogues encouraging them to influence policy change and the creation of incentives through a habitat bill and/or municipal ordinances for backyard habitat.

8.1.0.15 Engage government agencies, conservation partners and other stakeholders in discussions encouraging and supporting the creation of laws and policies requiring vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

8.1.0.16 Engage local governments in discussions regarding the importance of them adopting/passing ordinances which require assessing and addressing secondary impacts (i.e., ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

8.1.0.17 Engage municipalities in constructive dialogue to identify and minimize destruction of areas prioritized for early succession forest management.

8.1.0.18 Engage NJDOT, NJ Transit Authority and other road management entities, wildlife conservation organizations/agencies (e.g., Division of Fish and Wildlife, New Jersey Conservation Foundation, Conserve Wildlife Foundation of NJ), and communities and citizens in discussions regarding the importance of and methods to enhance habitat connectivity, and work together to develop feasible strategies for ensuring that wildlife can disperse naturally and safely across roads and similar barriers to terrestrial and/or aquatic habitats.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.20 Organize a small focal group of government and non-government agencies/organizations responsible for decisions regarding beach/dune management to share and coordinate their goals so that comprehensive planning can attempt to meet all needs.

8.1.0.21 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation human-subsidized and/or overabundant, native species cause to local nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.22 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation invasive species cause to native nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.26 Coordinate across federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to woodland landowners to adopt or endorse consistent best management practices concerning controlled burns to maintain and/or improve forested habitat for wildlife.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.34 Work with the NJ Education Association and Department of Education to design curriculum and outdoor experimental learning opportunities, and provide training to teachers on implementation of these activities.

8.1.0.37 Enlist landowners and NJ citizens in the protection of and survey efforts for SGCN, in particular rare species, by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management and wildlife-related volunteer programs.

8.1.0.38 Engage partners, stakeholders and land managers in constructive dialogue promoting forest stewardship for SGCN that use core forests and forested corridors.

8.1.0.40 Encourage researchers, land managers, naturalists and enthusiasts to follow proper procedures for the coordination and/or permitting of research/management activities involving wildlife and sensitive habitats, and discourage activities that alter vegetation or wetlands, or cause harm or disturbance to wildlife.

8.1.0.42 Engage citizens, wildlife observers and photographers through discussions and distributable information regarding the importance of and encouraging implementing responsible and ethical behavior when observing wildlife by developing an alliance of wildlife photographers and widely circulating recommendations on how to reduce impact.

8.1.0.44 Engage conservation partners, stakeholders, government agencies and other land stewards in constructive dialogues encouraging their inclusion of controlled burns in forest and other stewardship plans.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.1.0.48 Form cooperative partnerships with transportation and shipment agencies and companies to facilitate habitat creation and enhancement away from and outside of project areas and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.2 Recruitment and retention activities

8.2.3 For wildlife watching

8.2.3.1 Develop and implement nature-focused tourism opportunities including wildlife viewing sites, interpretive signage highlighting unique ecosystems/habitats, and wildlife-related recreational opportunities that do not negatively impact SGCN or their habitats.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.7 Develop and provide (or otherwise make publicly available) educational programs and/or materials that describe the negative impacts of off-road vehicles and watercraft use in and adjacent to critical SGCN habitats, and the importance of confining such activities to more appropriate locations and/or seasons.

8.3.0.8 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate recreationists and encourage landowners to eliminate garbage in the vicinity of suitable wildlife habitat, in particular SGCN habitat. Information should include the detrimental impacts garbage may have on various wildlife species.

8.3.0.9 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners and land managers to include only native plants in landscaping and restoration projects. Provide information to assist them in detecting problematic establishment of invasive, non-indigenous plants.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.11 Develop and provide (or otherwise make publicly available) educational programs and/or materials to the public, wildlife-related professionals, foresters, etc., that describe the value of species that are often feared (e.g., snakes, bats, spiders, Allegheny woodrat) and/or deemed a "nuisance" (e.g., squirrel, deer, snapping turtle), and therefore, persecuted by people. Include information on tolerance, proper identification, eviction from human dwellings, how to minimize the animal's presence on the property, and/or how to live in harmony with the animal.

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.24 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

8.3.0.25 Develop educational outreach programs for landowners, nurseries and the general public regarding the negative impacts of invasive and non-native plants on our natural communities.

8.3.0.26 Develop educational outreach programs for private and public landowners and land managers regarding the importance of and how to manage core forests and forested corridors in a way that will be beneficial for SGCN, particularly endangered, threatened and special concern species.

8.3.0.27 Develop educational outreach programs for public and private landowners and land managers regarding the importance of structural habitat diversity, methods to increase diversity, and/or incentive programs available to increase habitat diversity.

8.3.0.30 Develop educational outreach programs for private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.5 Develop a plan that directs the creation or expansion of energy or utility rights-of-way in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.6 Develop a plan that directs the creation or expansion of roads and railroads or the re-establishment of abandoned railroads within and adjacent to critical forested habitats in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.8 Develop a plan that focuses on strategies for oil pipelines to avoid sensitive habitats that would be highly impacted by oil spills.

9.1.0.9 Develop a plan that focuses on strategies to minimize the creation of renewable energy farms (e.g., solar, wind) and related infrastructures within and their impacts on forested habitats and the wildlife community.

9.1.0.10 Develop a plan that focuses on strategies to minimize the impacts of mining on critical forested habitats.

9.1.0.11 Develop a plan that focuses on strategies to minimize the impacts of power plants on critical forested habitats and the wildlife community.

9.1.0.13 Develop a plan to minimize agriculture that would result in groundwater withdrawal in critical forested areas.

9.1.0.14 Develop a plan to minimize development that would result in groundwater withdrawal in critical forested areas.

9.1.0.15 Develop a plan to minimize fragmentation of terrestrial and aquatic habitats by roads.

9.1.0.16 Develop a plan to minimize new lawnscapes and preserve natural vegetation within and adjacent to critical forest areas.

9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

9.1.0.21 Develop a plan to minimize the use of any-sized dam in critical forested areas.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.2 Organizational strategic and CMS planning

9.2.1 Organizational strategic and operational planning

9.2.1.1 Identify and codify legal ORV access areas on state lands.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.5 Develop response plans to address disease outbreaks within wildlife populations, in particular SGCN.

9.3.1.7 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.10 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.15 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.1.16 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3 Habitat management planning

9.3.3.5 Develop a management plan using forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

9.3.3.7 Develop a management plan to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

9.3.3.8 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.3.13 Develop a management plan that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas and prevents or ameliorates near-term impacts of climate change throughout the State, but in particular within the coastal and Delaware Bay areas.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.16 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.3.17 Develop a management plan for prescribed burning that will benefit Pinelands dependent species and increase or maintain habitat quality for these species in the Pinelands.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.21 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.3.28 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.3.29 Develop habitat management plans aimed at reducing or eliminating negative impacts of ORVs.

9.3.3.32 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3.34 Include controlled burn prescriptions in forest and stewardship plans to improve wildlife habitat.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.12 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed solar farm projects to reduce habitat fragmentation and minimize impacts on wildlife.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.2 Provide technical support to public and private landowners and land managers for controlling invasive, native and non-native plant species in order to increase structural habitat diversity.

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.7 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on the importance of maintaining habitat connectivity, minimizing fragmentation, and the use of CHANJ products to help them target areas for such planning.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.11 Provide educational resources, training programs, and on-the-ground guidance to private and public landowners and land managers on the benefits of and for creating young forest and early succession habitat for SGCN.

11.2.0.15 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and landowners about the importance of retaining and in an effort to protect, create, enhance and/or restore vegetation along aquatic habitats.

11.2.0.17 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of vernal pools and the protection, enhancement and/or restoration of biologically appropriate buffers.

11.2.0.22 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

11.2.0.23 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to SGCN habitats to promote the protection and/or enhancement of those adjacent habitats to increase the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and that connect conserved SGCN habitats.

11.2.0.24 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers on how to manage vegetated roadside areas (e.g., mowing, brush-hogging, etc.) on a schedule that avoids peak activity periods for wildlife and therefore, minimizes harm.

11.2.0.25 Provide educational resources, training programs, and on-the-ground guidance to resource managers regarding the assessment of and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) related to residential and commercial development.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.1 Engage partners and stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.3 Provide educational resources, training programs, and on-the-ground guidance to DOD to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop and implement forest management and other practices that minimize disturbances to SGCN (i.e., beyond their federal requirements).

11.2.1.5 Provide educational resources, training programs, and on-the-ground guidance to municipalities, state and federal agency resource managers on tasks such as writing and integrating Beach Management Plans into other management documents.

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

11.2.2 With private landowners

11.2.2.1 Provide technical support to farming operations and woodland landowners on ways to decrease clean farming (edge-to-edge) practices and create ecotones to benefit bobwhite and other species dependent on early successional habitat.

100 Law and Policy

100. Legislation

100.1.3 Sub-national Level

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.4 County and Local

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.3 Expand the acreages and enhance the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN through local ordinances.

100.1.4.14 Adopt/pass local ordinances which require assessing and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100.1.5.5 Develop legislation to provide financial support for the New Jersey Invasive Species Strike Team.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.5 Develop policies that will promote improved and secure habitat connections between conserved SGCN habitats.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.12 Develop policies that promote the preservation and protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.23 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.31 Create or expand tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMPs.

100.3.0.32 Coordinate regulations across agencies to maximize availability of and enrollment in existing Forestry Stewardship Programs (e.g., "Woodland Stewards", Farm Bill, partners, etc.) to maintain and/or improve forest habitat.

100.3.0.38 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.3.0.39 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.3.0.40 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.45 Increase the controlled burn season to focus on restoring vegetative communities.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.48 Propose new State law or regulation mandating that a State-level "development impact fee" be assessed on all new development approved by municipalities (via the Municipal Land Use Law processes), and dedicate such monies to the development and implementation of regional Habitat Conservation Plans (or existing plans/programs serving the same regional function).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.53 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded rights-of-way corridors associated with energy transport/transmission.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100.3.0.73 Develop regulations that would exempt the conversion of lawns to native vegetation (beneficial to wildlife) from local lawn ordinances.

100.3.2 State Land Acquisition Programs

100.3.2.1 Increase opportunities for habitat restoration by making any necessary policy changes to state, federal and local land acquisition programs (e.g., Green Acres, Blue Acres, etc.) to allow for acquisition within abandoned or failing bay shore communities, including mechanisms to relocate displaced people and infrastructure.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.2 Create a policy that requires the NJ DEP to incorporate scientific information regarding climate change and sea level rise (e.g., predictions, habitat management/acquisition efforts to enhance resilience to inundation) on their websites and to work with other government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

100.4.0.3 Develop policies for mandatory buffer strips on preserved farmlands and state-owned agricultural lands.

100.4.0.8 Develop a white paper addressing the impacts that existing, new or expanded rights-of-way have upon wildlife, wildlife habitats and habitat connectivity.

100.4.0.10 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.4.0.11 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.4.0.12 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.4.0.13 Develop policies for different circumstances (e.g., roadsides and medians, riparian, aquatic and terrestrial habitats) that outline appropriate habitat/vegetation management strategies and schedules to minimize risks to and benefit wildlife.

100.4.0.16 Develop policies to implement habitat management strategies that will increase the structural diversity surrounding areas used for energy, mining, and transportation and service corridors which include but are not limited to the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-

100.4.0.17 Develop policies to implement habitat management strategies, including prescribed burns, that will increase the structural diversity on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies to control and reduce the impacts of invasive, non-native species in order to increase structural habitat diversity.

100.4.0.18 Develop policies to minimize the extent of infrastructure associated with energy and service corridors or areas (e.g., wind and solar farms, pipelines, utility lines) and that require the implementation of habitat management strategies that will increase the structural diversity in the area including (e.g., the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides).

100.4.0.19 Develop regulations that will minimize the creation of new barriers, remove or replace current barriers with appropriately-sized systems to accommodate wildlife dispersal, and to minimize road widening and traffic volume increases within critical wildlife habitat areas.

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.24 Develop policies to provide financial support for the New Jersey Invasive Species Strike Team.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Hoary Elfin

Focal species that comprise this Conservation Target:

Hoary Elfin

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:
- 1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.1.1.2 Loss, alteration and/or degradation of habitat.
- 1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:
- 1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.2.1.2 Loss, alteration and/or degradation of habitat.
- 1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:
- 1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.3.1.2 Loss, alteration and/or degradation of habitat.
- 1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture (Avg. Score: 3.00)

NJ Specific Threats:
- 2.1.1.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.2 Small-holder Farming (Avg. Score: 1.00)

NJ Specific Threats:
- 2.1.2.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.
- 2.1.2.2 Fragments terrestrial and aquatic habitats.

2.1.3 Agro-industry (Avg. Score: 3.00)

NJ Specific Threats: 2.1.3.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.3.2 Fragments terrestrial and aquatic habitats.

2.1.3.5 Loss of ecotones by implementing clean farming (edge-to-edge) practices degrades habitat for early successional wildlife.

2.2 Wood and Pulp Plantations

2.2.1 Small Holder (Avg. Score: 1.00)

NJ Specific Threats: 2.2.1.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.2.2 Agro-industry Plantations (Avg. Score: 1.00)

NJ Specific Threats: 2.2.2.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.3 Livestock Farming and Ranching

2.3.2 Small-holder Grazing (Avg. Score: 1.00)

NJ Specific Threats: 2.3.2.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.2.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

2.3.2.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.2.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

2.3.3 Agro-industry Grazing (Avg. Score: 3.00)

NJ Specific Threats: 2.3.3.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.3.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

2.3.3.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.3.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

3 Energy Production and Mining

3.2 Mining and Quarrying

3.2.2 Surface Mining - Rock Quarry (and sand quarries) (Avg. Score: 1.00)

NJ Specific Threats: 3.2.2.1 Fragments terrestrial and aquatic habitats.

3.2.2.2 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

3.3 Renewable Energy

3.3.2 Solar Power (Avg. Score: 1.00)

NJ Specific Threats: 3.3.2.2 Loss, alteration and/or degradation of habitat.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads (Avg. Score: 1.00)

NJ Specific Threats: 4.2.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species, inhibiting dispersal of non-volant animals, reducing gene flow, and creating barriers to fish when service line-associated roads cross streams (e.g., bridges, culverts, fords, etc.).

4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

4.2.2 Management of rights-of-way or communication tower facilities and/or their associated access roads (Avg. Score: 3.00)

NJ Specific Threats: 4.2.2.1 Improper or poorly scheduled vegetation management can cause direct mortality to and may reduce productivity of wildlife.

5 Biological Resource Use

5.1 Hunting and Collecting Terrestrial Animals

5.1.1 Intentional Use (Avg. Score: 1.00)

NJ Specific Threats: 5.1.1.1 Illegal collection of wildlife can have detrimental impacts on populations.

5.2 Gathering Terrestrial Plants

5.2.3 Control (Avg. Score: 2.00)

NJ Specific Threats: 5.2.3.1 Alteration or control of undesirable plants or plant communities can destroy important food and nectar plants for native insects and animals.

5.3 Logging and Wood Harvesting

5.3.1 Intentional Use (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.1.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.1.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.1.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.1.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.1.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.1.6 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices in Atlantic White Cedar stands may destroy a unique wildlife wetland habitat that is difficult, and takes time, to restore.

5.3.2 Intentional Use (large scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.2.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.2.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.2.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.2.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.2.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.2.6 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices in Atlantic White Cedar stands may destroy a unique wildlife wetland habitat that is difficult, and takes time, to restore.

5.3.3 Unintentional effects (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.3.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4 Unintentional effects (large scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.4.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4.5 Lack of appropriate, sustainable forest management can lead to a decrease in forest habitat diversity, degraded habitat for many forest species, the loss of habitat for early-successional species, and/or the loss of unique habitats for species that need canopy breaks and multi-aged tree composition to fulfill various life history requirements.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized) (Avg. Score: 3.00)

NJ Specific Threats: 6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.

6.1.1.3 Increased risk of harassment that results in a change in wildlife behavior and/or direct mortality from vehicle strikes.

6.1.1.6 Off-road vehicles can be a mechanism of transference of wildlife diseases and invasive plant species if gear and apparel are not properly sanitized between sites.

7 Natural Systems Modifications

7.1 Fire and Fire Suppression

7.1.1 Increase in Fire Frequency/Intensity (Avg. Score: 3.00)

NJ Specific Threats: 7.1.1.1 Increase in frequency and intensity of wild fires as a result of droughts and heat waves drying out vegetation and litter.

7.1.1.2 Increase in frequency of wild fires as a result of illegal activities.

7.1.1.3 Unnatural fire regimes occurring as a result of military exercises.

7.1.1.4 Lack of diversity in age structure and composition of vegetation due to expansive, frequent fires.

7.1.2 Suppression of Fire Frequency/Intensity (Avg. Score: 3.00)

NJ Specific Threats: 7.1.2.1 Shift in vegetative communities as a result of suppression of natural fires.

7.1.2.2 Lack of diversity in age structure and composition of vegetation due to the suppression of fire.

7.3 Other Ecosystem Modifications

7.3.2 Inappropriate timing of mowing (Avg. Score: 3.00)

NJ Specific Threats: 7.3.2.1 Increased risk of direct mortality and/or reduced productivity of wildlife, as well as reduced use by migrating species.

7.3.4 Lack of natural disturbance patterns or ecosystem functions due to species loss (Avg. Score: 3.00)

NJ Specific Threats: 7.3.4.5 The lack of forest disturbance minimizes the diversity of herbaceous vegetation and other shrubs and trees that need a lot of sunlight to grow.

7.3.5 Poor habitat management (Avg. Score: 3.00)

NJ Specific Threats: 7.3.5.1 Improper or poorly scheduled maintenance of man-made corridors (e.g., roadsides and medians) can cause direct mortality to and may reduce productivity of wildlife.

7.3.5.3 Vegetation clearing removes terrestrial and riparian corridors for animal movement, shelter, and resting areas.

7.3.5.5 Habitat management that alters or removes vegetation without implementing long-term management increases the risk of invasive and exotic plants establishing themselves, outcompeting native vegetation.

7.3.5.6 Habitat management, including that which occurs on public and private lands, that does not consider timing and species' behaviors can result in the direct mortality and/or alteration or loss of habitat.

7.3.5.7 Improperly planned habitat management and/or mitigation efforts along roadsides and within the medians can attract wildlife and increase the risk of vehicle strikes.

7.3.5.12 Lack of diversity in age structure and composition of vegetation due to lack of natural disturbances and/or vegetation management.

7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.1.1.1 Displace or outcompete native species for resources.

8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.

8.1.1.3 Invasive, non-native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

8.1.1.4 Invasive, non-native animals increase the risk of predation on native animals and/or herbivory on native vegetation.

8.1.1.5 Invasive, non-native animals and plants increase the risk of introduction and transference of diseases

8.1.1.6 Invasive, non-native plants may create physical barriers for some species.

8.1.4 Invasive non-native terrestrial/wetland animals (Avg. Score: 2.00)

NJ Specific Threats: 8.1.4.1 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.6 Invasive non-native fungal/bacterial diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.1.6.1 The introduction of non-native fungal and bacterial diseases threatens native populations and ecosystems.

8.2 Problematic Native Species/Diseases

8.2.2 Named Species (Avg. Score: 1.00)

NJ Specific Threats: 8.2.2.2 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.4 Problematic Species/Diseases of Unknown Origin

8.4.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.4.1.1 Non-native or poorly understood diseases and parasites could potentially impact native animals.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.3 Agricultural and Forestry Effluents

9.3.2 Soil Erosion and Sedimentation (Avg. Score: 1.00)

NJ Specific Threats: 9.3.2.2 Soil erosion and sedimentation limit the re-establishment of plants needed by terrestrial wildlife as cover and a food base.

9.3.3 Herbicides and Pesticides (Avg. Score: 3.00)

NJ Specific Threats: 9.3.3.1 Pesticides degrade terrestrial and aquatic habitats, especially streams, ponds and wetlands. Aquatic wildlife are particularly sensitive to these contaminants, which can cause developmental and behavioral abnormalities and reproductive failure. Some contaminants may bioaccumulate in predatory fish and birds and disrupt reproduction.

9.3.3.3 Use of pesticides can directly harm non-target species through direct contact and/or by reducing and/or contaminating their food supply.

9.3.3.4 Use of herbicides can destroy beneficial food and nectar plants for insects.

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture (Avg. Score: 3.00)

NJ Specific Threats: 9.3.5.1 Use of pesticides, insecticides, and/or herbicides can directly harm non-target species, such as amphibians and beneficial invertebrates through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5.2 Use of herbicides can destroy beneficial food and nectar plants for insects.

9.3.5.4 Improper use of current insecticides, such as those containing esfenvalerate, prallethrin, or piperonyl butoxide, or past use of pesticides containing chlordane still present in the soils, are toxic to various wildlife species, and can cause injury, mortality, or other effects that impair population viability.

9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.5 Air-Bourne Pollutants

9.5.4 Other (Avg. Score: 1.00)

NJ Specific Threats: 9.5.4.1 Dust and/or airborne sedimentation from construction sites, agricultural operations or related earth disturbances can introduce mineral or organic sediments into adjacent wildlife habitats, degrading their quality and suitability for wildlife short-term and/or long-term.

9.5.6 Herbicides and Pesticides (Avg. Score: 3.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 3.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.6 Phenology Shifting or Alteration

11.6.1 Phenology shifts related to pollination ecology (Avg. Score: 1.00)

NJ Specific Threats: 11.6.1.1 Alters inter-specific relationships of wildlife and vegetation, ultimately leading to detrimental impacts on the ecological system.

11.6.3 Phenology shifts related to species redistribution (Avg. Score: 1.00)

NJ Specific Threats: 11.6.3.1 Shifts in timing of species migration, breeding and hibernation, and available food resources, as a result of wildlife range shifts driven by climate change.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 3.00)

NJ Specific Threats: 12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.2 Lack of up-to-date existing information (Avg. Score: 3.00)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.3 Need to answer research question (Avg. Score: 3.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.4 Need to develop new technique (Avg. Score: 3.00)

NJ Specific Threats: 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 1.00)

NJ Specific Threats: 12.3.0.1 Regulatory habitat protections within state land use regulations are spatially limited to specific geographic areas (e.g., Pinelands, Coastal Area) or geographic features (e.g., wetlands, streams) and so fail to protect critical habitats that exist outside of these regulated areas.

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.9 Prescribed burns implemented by the NJ Forest Fire Service are constrained by State air quality regulations to a timeframe where seasonal weather conditions are less than ideal for effective burning. As a result, the Forest Fire Service is limited in the number of overall prescribed burns it can implement to restore habitat for wildlife.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 1.00)

NJ Specific Threats:
- 12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.
- 12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.
- 12.4.0.5 Bureau of Forest Fire Management policy has traditionally implemented prescribed burns on State lands for the sole purpose of public safety (i.e., addressing hazard fuel reduction), missing opportunities to burn in a manner that would additionally manage habitat for ecological diversity.
- 12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 3.00)

NJ Specific Threats:
- 14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.
- 14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.
- 14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 3.00)

NJ Specific Threats:
- 14.2.1.1 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various forest management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 1.00)

NJ Specific Threats:
- 15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

- 1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.5 Secure and promote the protection/restoration of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through incentive programs.

1.2.1.6 Secure and promote the protection/restoration of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.9 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing Forestry Stewardship Programs.

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.12 Create incentives (non-monetary and/or monetary) for land developers to redevelop abandoned areas (e.g., shopping centers, office complexes) to minimize the loss of natural habitats and reduce the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.14 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of herbicides and pesticides, and implementing more ecologically safe strategies when using such products.

1.2.1.15 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of rodenticides, and implementing more ecologically safe strategies when using such products.

1.2.1.16 Create incentives (non-monetary and/or monetary) within State regulations (mitigations requirements or credit, BMP satisfaction, etc.) to promote the use of retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.17 Develop a public-relations oriented certification program for private retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.18 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and land managers to control and reduce the impacts of invasive, native and non-native species in order to increase structural habitat diversity.

1.2.1.19 Create incentives for federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to farmers, woodland landowners, and private landowners to adopt and/or endorse consistent BMPs concerning controlled burns to maintain and/or improve wildlife habitat.

1.2.1.20 Coordinate across government agencies and non-government organizations to create or expand upon tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMP's.

1.2.1.21 Create and/or support market-based programs that subsidize or create branding for products derived sustainably from managed wildlife habitats.

1.2.1.22 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to horse/livestock farm owners and managers to increase structural habitat diversity in and around the farms by managing vegetation for a variety of species, in particular, farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

1.2.1.23 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to provide cost shares and/or plan approvals for management based on management approaches and prescriptions.

1.2.1.24 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners, with habitat of suitable patch size to support breeding grassland-dependent species, to alter the timing of vegetation management to benefit grassland and pollinator species.

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

1.2.1.28 Create incentives to implement dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

2 Direct Management of Natural Resources

2.3 Fire management

2.3.2 Fuel reduction

2.3.2.1 Prevent wildfires by reducing natural fuel (e.g., leaf litter).

2.3.3 Prescribed burning

2.3.3.1 Evaluate different management techniques of prescribed burns that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

2.3.3.2 Conduct prescribed burning in Northern New Jersey forests to maintain and regenerate a mosaic of upland forest habitats.

2.3.3.3 Conduct prescribed burning to improve wildlife habitat.

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.1 Control invasive insect infestations by implementing BMP strategies through biological, chemical and/or mechanical means that will depress, or when appropriate, eradicate populations in a manner that avoids excessive harm to non-target species using BMPs to control infestations and limit their spread based on an inventory of invasive insect distribution and response to outbreaks.

2.8.0.2 Develop, implement, monitor and evaluate pest control/management strategies to reduce the impacts of over-abundant wildlife species (native and/or native, invasive species) on native vegetation and the degradation of habitats supporting SGCN. Over-abundant wildlife species include but are not limited to mute swans, Canada geese, beaver and white-tailed deer.

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.5 Implement biologically safe and appropriate control/management strategies, and where appropriate, eradication strategies to reduce the impacts and/or limit the distribution of invasive and/or non-native plant species within or near aquatic systems using methods that will provide the most protection to the aquatic and riparian ecological system, and minimize disturbance to the soil and wildlife. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.8.0.6 Implement long-term management of invasive and/or non-native plants to help maintain functioning ecological systems and biological diversity, and to enhance travel corridors. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.2 Improve the availability of prey/food resources through terrestrial and aquatic plantings and habitat restoration for SGCN populations, in particular for those populations thought to be limited due wholly or in part to a lack of (or contaminated) food resources, and for migratory species (birds, bats, invertebrates).

2.10.0.3 Restore and/or enhance habitats to benefit urban-associated SGCN.

2.10.0.4 Restore and/or enhance suitable travel corridors connecting conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.8 Protect significant natural and/or unique communities by implementing best management practices when conducting habitat restoration strategies.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.10 Minimize the loss of important habitats (e.g., coastal scrub-shrub and grassy habitats, high and low marsh habitats, etc.) that provide nesting, migrating, and wintering areas for SGCN birds and other coastal and marsh-dependent species through habitat restoration efforts.

2.10.0.11 Restore and/or enhance critical migratory terrestrial and aquatic habitats (e.g., beach, grasslands, forest, scrub-shrub, etc.) for songbirds, raptors, shorebirds, waterfowl, bats and invertebrates through habitat restoration efforts and expand habitat restoration to adjacent private lands to increase the effective size of the habitat.

2.10.0.12 Create and/or maintain scrub-shrub habitats through revegetation efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.15 Restore and/or enhance terrestrial and aquatic habitats proximate to but not adjacent to roads and other transportation corridors for terrestrial-bound SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.10.0.21 Restore and/or enhance understory habitats that suppress invasive species and provide critical resources and enhance sheltering, foraging, and nesting cover for wildlife.

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.11.0.3 Create suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats through vegetation management.

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through vegetation management.

2.11.0.6 Reclaim degraded rare species habitats by conducting vegetation management needed to restore habitat value for the documented/target SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.23 Implement appropriate habitat management actions in areas where natural disturbances, such as wildfire, have been precluded.

2.11.0.24 Conduct vegetation management adjacent to aquatic habitats following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.25 Conduct vegetation management along access roads following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.26 Conduct vegetation management along roadsides and medians, avoiding peak activity periods for wildlife, that enhances wildlife dispersal naturally and safely across roads and similar barriers to/between terrestrial and/or aquatic habitats.

2.11.0.27 Conduct vegetation management for target shrub- or young forest-dependent SGCN following BMPs to minimize the risk of the establishment of invasive and non-native plants.

2.11.0.28 Conduct vegetation management in agricultural areas following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.29 Conduct vegetation management on transportation and service corridors (i.e., rights-of-way) following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.30 Identify and prioritize areas where various management tools (such as increasing salinity through the management of water levels or chemical applications) may be effective in reducing phragmites within and restoring marsh habitat.

2.11.0.31 In areas where vegetative communities are shifting due to fire suppression and controlled burns are not feasible, manage vegetation to improve wildlife habitat.

2.11.0.32 Increase structural habitat diversity around and when feasible, within agricultural landscapes by managing vegetation for a variety of species, in particular, those farms that have removed scrub-shrub habitat and/or fragmented forests, and by implementing ecologically best practices (e.g., no-till farming, maintaining hedgerows, buffer set-asides, etc.).

2.11.0.33 Increase structural habitat diversity by implementing long-term vegetation management to minimize the potential for the establishment of invasive and/or non-native plants that may outcompete native vegetation.

2.11.0.34 Increase structural habitat diversity by managing residential, commercial and recreational areas' landscapes for a variety of species. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.

2.11.0.38 Increase structural habitat diversity in and around horse/livestock farms by managing vegetation for a variety of species, in particular, in and around farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

2.11.0.39 Increase structural habitat diversity in and around solar farms by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.40 Increase structural habitat diversity surrounding areas used for energy, mining, and transportation and service corridors by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides, and avoid managing habitat during the breeding seasons for ground-nesting birds, reptiles, amphibians and small mammals.

2.11.0.41 Increase structural habitat diversity through the implementation of a variety of vegetation management practices such a prescribed burns (either increasing or decreasing their frequency depending on the site and objective), plantings, etc. that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.42 Increase structural habitat diversity within wind farms for terrestrial bound and low-flying species and around wind farms for other wildlife by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.43 Manage forests to increase variation in age structure and composition using BMPs that promote and maintain functioning ecological forest-based systems and biological diversity.

2.11.0.45 Regularly and/or rotationally create young forest habitat in targeted areas to maintain and regenerate a mosaic of upland forest habitats that will benefit shrub- and young forest-dependent species.

2.14 Wildlife disease management

2.14.0 Wildlife disease strategy development and investigation

2.14.0.1 Investigate diseases/pathogens impacting SGCN and/or their habitats.

2.14.0.2 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

2.14.0.3 Protect SGCN from exotic pathogen introduction or incident through implementation of a "rapid response plan"; DFW to give priority attention to these species in planning and/or implementing a response.

2.14.0.4 Conduct long-term monitoring of diseases in vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts.

2.14.0.5 Assess the impacts of diseases on the life cycles of wildlife.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.14 Identify areas with invasive, aquatic plants and animals and collect a detailed baseline assessment of the species' status and distribution. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort. Researchers and contractors performing Forest Stewardship Inventories and/or Plans on state lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.0.0.15 Conduct long-term monitoring of areas identified as having invasive, aquatic plants and animals to track the species' status/progress over time with or without the implementation of management strategies. Areas without management strategies should be assessed and prioritized for management/control. Areas where management strategies are being implemented should include an assessment of the management effort and identify/recommend and implement necessary changes to improve its success. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort.

3.0.0.26 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species including objectives and guidance pertaining to and the condition/status of critical and supporting habitats.

3.0.0.27 Evaluate the effectiveness of strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals through research and monitoring. Develop and provide NJ DEP and other appropriate governing agencies/commissions a summary of findings and recommendations to improve such efforts.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.7 Track (via a database that includes a GIS component) and research problematic species and diseases to determine their distribution, impacts on SGCN wildlife/wildlife communities, and develop potential control measures.

3.2.0.8 Implement and conduct long-term monitoring of control measures aimed at minimizing the impacts of problematic species and/or diseases to evaluate the effectiveness of such efforts and to identify and incorporate additional strategies as appropriate.

3.2.0.18 Conduct baseline surveys/inventories to better understand the distribution of fish and invertebrate (including freshwater mussels) populations.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.2 Age, size and sex structure

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.3 Baseline inventory

3.2.3.9 Investigate hazardous environmental issues that may impact grassland invertebrates.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.6 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) that could, through revegetation and/or enhancement efforts, become suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN.

3.3.1.7 Map and prioritize existing and potential areas for early succession forest management. Share the results with state, county and municipal planners.

3.3.1.8 Assess the availability and suitability of forest habitats for SGCN species (particularly reptiles and amphibians, birds, pollinators, and tiger beetles) in southern forests since Superstorm Sandy.

3.3.1.10 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and document fish SGCN habitats by plotting their distributions in GIS and submitting the data to the State for integration into the DEP's Biotics database.

3.3.1.16 Gather "best information" for spatial modeling and update/create a current model/depiction of anticipated habitat shifts from sea-level rise, flooding, etc.

3.3.1.17 Identify and map undeveloped roads and trails in all conserved forests, and create a database of locations. Integrate information regarding potentially sensitive areas.

3.3.1.18 Conduct an assessment using available data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels.

3.3.1.19 Identify and codify legal ORV access areas on state (and if appropriate, other conserved) lands. Provide GIS mapping to the landowner for potential use in directing such recreational activities.

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.2 Monitoring

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.8 Evaluate the effectiveness of current prescribed burning practices on Pinelands dependent species.

3.3.2.10 Evaluate the efficacy and success of different management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.3.2.15 Investigate the effectiveness of management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.3.2.20 Once a system is developed for reporting and qualifying new locations of invasive species, develop, implement and monitor/evaluate invasive species removal strategies at identified locations. Priority should be given to those areas critical to SGCN and/or contain unique and/or rare plant communities supporting SGCN and/or other fish/wildlife species.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.3 Develop/improve management techniques that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.9 Develop strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.3.16 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.3.19 Work with foresters to develop prescribed burning practices for Pinelands dependent species that increase or maintain habitat quality for these species in the Pinelands.

3.5.3.21 Develop management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.24 Based on research, modify management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.5 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

3.5.4.6 Investigate the feasibility of mitigating for the impacts of contaminants to vulnerable wildlife, particularly SGCN. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.5.4.14 Develop and implement agreements, and update existing agreements, with government agencies regarding the protection of critical SGCN habitats (e.g., significant breeding populations of beach nesting birds, colonial waterbird nesting areas, bat colonies, etc.).

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.18 Investigate the effectiveness of survey techniques through selected “ground truthing” and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

3.5.4.21 Develop BMPs to address problematic species and diseases of unknown origin.

4 Education

4.1 Educator/Instructor training

4.1.0 Public education

4.1.0.1 Provide educational resources and training programs to private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

5 Facilities and Areas

5.15 Wildlife Management Areas

5.15.6 Roads

5.15.6.1 Clearly post areas/roads where vehicle access is permitted.

5.15.6.2 Clearly post areas/trails where vehicle access is not permitted.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.7 Secure and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.8 Secure and protect scrub-shrub habitats for SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.8 Promote the protection of scrub-shrub habitats for SGCN through conservation area designations.

6.4 Private lands agreements

6.4.0 Private land agreement strategies

6.4.0.1 Enter into private lands agreements to expand control burns on private lands, in particular those adjacent to conserved lands to improve SGCN habitats.

7 Law Enforcement

7.1 Law enforcement

7.1.3 Sub-national Level

7.1.3.2 Increase the number of law enforcement officers tending to wildlife issues to a reasonable number to sufficiently cover the State and marine waters.

7.1.4 Scale Unspecified

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.19 Implement policies that protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

7.1.4.26 Educate law enforcement personnel that there may be unauthorized research projects taking place and to encourage them to investigate any activities that appear to be harmful to wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.2 Develop a team of personnel from government entities, conservation organizations and other stakeholders engaged in oil/gas spill response for marine and freshwater habitats to develop a feasible plan for oil spill response and/or to amend NJ's current oil spill response plan that clearly outlines each organizations responsibilities and an assessment and location list of available equipment for boom deployment during oil spills.

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.1.0.4 Engage government agencies, conservation partners and other stakeholders in constructive dialogues encouraging them to influence policy change and the creation of incentives through a habitat bill and/or municipal ordinances for backyard habitat.

8.1.0.15 Engage government agencies, conservation partners and other stakeholders in discussions encouraging and supporting the creation of laws and policies requiring vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

8.1.0.16 Engage local governments in discussions regarding the importance of them adopting/passing ordinances which require assessing and addressing secondary impacts (i.e., ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

8.1.0.17 Engage municipalities in constructive dialogue to identify and minimize destruction of areas prioritized for early succession forest management.

8.1.0.18 Engage NJDOT, NJ Transit Authority and other road management entities, wildlife conservation organizations/agencies (e.g., Division of Fish and Wildlife, New Jersey Conservation Foundation, Conserve Wildlife Foundation of NJ), and communities and citizens in discussions regarding the importance of and methods to enhance habitat connectivity, and work together to develop feasible strategies for ensuring that wildlife can disperse naturally and safely across roads and similar barriers to terrestrial and/or aquatic habitats.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.20 Organize a small focal group of government and non-government agencies/organizations responsible for decisions regarding beach/dune management to share and coordinate their goals so that comprehensive planning can attempt to meet all needs.

8.1.0.21 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation human-subsidized and/or overabundant, native species cause to local nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.22 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation invasive species cause to native nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.26 Coordinate across federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to woodland landowners to adopt or endorse consistent best management practices concerning controlled burns to maintain and/or improve forested habitat for wildlife.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.34 Work with the NJ Education Association and Department of Education to design curriculum and outdoor experimental learning opportunities, and provide training to teachers on implementation of these activities.

8.1.0.37 Enlist landowners and NJ citizens in the protection of and survey efforts for SGCN, in particular rare species, by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management and wildlife-related volunteer programs.

8.1.0.38 Engage partners, stakeholders and land managers in constructive dialogue promoting forest stewardship for SGCN that use core forests and forested corridors.

8.1.0.40 Encourage researchers, land managers, naturalists and enthusiasts to follow proper procedures for the coordination and/or permitting of research/management activities involving wildlife and sensitive habitats, and discourage activities that alter vegetation or wetlands, or cause harm or disturbance to wildlife.

8.1.0.42 Engage citizens, wildlife observers and photographers through discussions and distributable information regarding the importance of and encouraging implementing responsible and ethical behavior when observing wildlife by developing an alliance of wildlife photographers and widely circulating recommendations on how to reduce impact.

8.1.0.44 Engage conservation partners, stakeholders, government agencies and other land stewards in constructive dialogues encouraging their inclusion of controlled burns in forest and other stewardship plans.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.1.0.48 Form cooperative partnerships with transportation and shipment agencies and companies to facilitate habitat creation and enhancement away from and outside of project areas and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.2 Recruitment and retention activities

8.2.3 For wildlife watching

8.2.3.1 Develop and implement nature-focused tourism opportunities including wildlife viewing sites, interpretive signage highlighting unique ecosystems/habitats, and wildlife-related recreational opportunities that do not negatively impact SGCN or their habitats.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.7 Develop and provide (or otherwise make publicly available) educational programs and/or materials that describe the negative impacts of off-road vehicles and watercraft use in and adjacent to critical SGCN habitats, and the importance of confining such activities to more appropriate locations and/or seasons.

8.3.0.8 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate recreationists and encourage landowners to eliminate garbage in the vicinity of suitable wildlife habitat, in particular SGCN habitat. Information should include the detrimental impacts garbage may have on various wildlife species.

8.3.0.9 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners and land managers to include only native plants in landscaping and restoration projects. Provide information to assist them in detecting problematic establishment of invasive, non-indigenous plants.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.11 Develop and provide (or otherwise make publicly available) educational programs and/or materials to the public, wildlife-related professionals, foresters, etc., that describe the value of species that are often feared (e.g., snakes, bats, spiders, Allegheny woodrat) and/or deemed a "nuisance" (e.g., squirrel, deer, snapping turtle), and therefore, persecuted by people. Include information on tolerance, proper identification, eviction from human dwellings, how to minimize the animal's presence on the property, and/or how to live in harmony with the animal.

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.24 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

8.3.0.25 Develop educational outreach programs for landowners, nurseries and the general public regarding the negative impacts of invasive and non-native plants on our natural communities.

8.3.0.26 Develop educational outreach programs for private and public landowners and land managers regarding the importance of and how to manage core forests and forested corridors in a way that will be beneficial for SGCN, particularly endangered, threatened and special concern species.

8.3.0.27 Develop educational outreach programs for public and private landowners and land managers regarding the importance of structural habitat diversity, methods to increase diversity, and/or incentive programs available to increase habitat diversity.

8.3.0.30 Develop educational outreach programs for private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.5 Develop a plan that directs the creation or expansion of energy or utility rights-of-way in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.6 Develop a plan that directs the creation or expansion of roads and railroads or the re-establishment of abandoned railroads within and adjacent to critical forested habitats in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.8 Develop a plan that focuses on strategies for oil pipelines to avoid sensitive habitats that would be highly impacted by oil spills.

9.1.0.9 Develop a plan that focuses on strategies to minimize the creation of renewable energy farms (e.g., solar, wind) and related infrastructures within and their impacts on forested habitats and the wildlife community.

9.1.0.10 Develop a plan that focuses on strategies to minimize the impacts of mining on critical forested habitats.

9.1.0.11 Develop a plan that focuses on strategies to minimize the impacts of power plants on critical forested habitats and the wildlife community.

9.1.0.13 Develop a plan to minimize agriculture that would result in groundwater withdrawal in critical forested areas.

9.1.0.15 Develop a plan to minimize fragmentation of terrestrial and aquatic habitats by roads.

9.1.0.16 Develop a plan to minimize new lawnscapes and preserve natural vegetation within and adjacent to critical forest areas.

9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

9.1.0.21 Develop a plan to minimize the use of any-sized dam in critical forested areas.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.2 Organizational strategic and CMS planning

9.2.1 Organizational strategic and operational planning

9.2.1.1 Identify and codify legal ORV access areas on state lands.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.5 Develop response plans to address disease outbreaks within wildlife populations, in particular SGCN.

9.3.1.7 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.10 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.15 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.1.16 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3 Habitat management planning

9.3.3.5 Develop a management plan using forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

9.3.3.7 Develop a management plan to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

9.3.3.8 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.3.13 Develop a management plan that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas and prevents or ameliorates near-term impacts of climate change throughout the State, but in particular within the coastal and Delaware Bay areas.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.16 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.3.17 Develop a management plan for prescribed burning that will benefit Pinelands dependent species and increase or maintain habitat quality for these species in the Pinelands.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.21 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.3.28 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.3.29 Develop habitat management plans aimed at reducing or eliminating negative impacts of ORVs.

9.3.3.32 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3.34 Include controlled burn prescriptions in forest and stewardship plans to improve wildlife habitat.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.12 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed solar farm projects to reduce habitat fragmentation and minimize impacts on wildlife.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.2 Provide technical support to public and private landowners and land managers for controlling invasive, native and non-native plant species in order to increase structural habitat diversity.

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.7 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on the importance of maintaining habitat connectivity, minimizing fragmentation, and the use of CHANJ products to help them target areas for such planning.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.11 Provide educational resources, training programs, and on-the-ground guidance to private and public landowners and land managers on the benefits of and for creating young forest and early succession habitat for SGCN.

11.2.0.15 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and landowners about the importance of retaining and in an effort to protect, create, enhance and/or restore vegetation along aquatic habitats.

11.2.0.17 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of vernal pools and the protection, enhancement and/or restoration of biologically appropriate buffers.

11.2.0.19 Provide educational resources and technical support to public and private landowners and land managers to promote the protection and/or enhancement of scrub-shrub habitats for SGCN.

11.2.0.22 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

11.2.0.23 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to SGCN habitats to promote the protection and/or enhancement of those adjacent habitats to increase the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and that connect conserved SGCN habitats.

11.2.0.24 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers on how to manage vegetated roadside areas (e.g., mowing, brush-hogging, etc.) on a schedule that avoids peak activity periods for wildlife and therefore, minimizes harm.

11.2.0.25 Provide educational resources, training programs, and on-the-ground guidance to resource managers regarding the assessment of and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) related to residential and commercial development.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.1 Engage partners and stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.3 Provide educational resources, training programs, and on-the-ground guidance to DOD to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop and implement forest management and other practices that minimize disturbances to SGCN (i.e., beyond their federal requirements).

11.2.1.5 Provide educational resources, training programs, and on-the-ground guidance to municipalities, state and federal agency resource managers on tasks such as writing and integrating Beach Management Plans into other management documents.

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

11.2.2 With private landowners

11.2.2.1 Provide technical support to farming operations and woodland landowners on ways to decrease clean farming (edge-to-edge) practices and create ecotones to benefit bobwhite and other species dependent on early successional habitat.

100 Law and Policy

100. Legislation

100.1.3 Sub-national Level

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.4 County and Local

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.3 Expand the acreages and enhance the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN through local ordinances.

100.1.4.12 Secure scrub-shrub habitats for SGCN through local ordinances.

100.1.4.14 Adopt/pass local ordinances which require assessing and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100.1.5.5 Develop legislation to provide financial support for the New Jersey Invasive Species Strike Team.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.5 Develop policies that will promote improved and secure habitat connections between conserved SGCN habitats.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.12 Develop policies that promote the preservation and protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.15 Develop policies that promote protecting and restoring scrub-shrub habitats to benefit shrub-dependent SGCN.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.23 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.31 Create or expand tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMPs.

100.3.0.32 Coordinate regulations across agencies to maximize availability of and enrollment in existing Forestry Stewardship Programs (e.g., "Woodland Stewards", Farm Bill, partners, etc.) to maintain and/or improve forest habitat.

100.3.0.38 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.3.0.39 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.3.0.40 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.45 Increase the controlled burn season to focus on restoring vegetative communities.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.48 Propose new State law or regulation mandating that a State-level "development impact fee" be assessed on all new development approved by municipalities (via the Municipal Land Use Law processes), and dedicate such monies to the development and implementation of regional Habitat Conservation Plans (or existing plans/programs serving the same regional function).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.53 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded rights-of-way corridors associated with energy transport/transmission.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.65 Develop regulations that when implemented will protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100.3.0.73 Develop regulations that would exempt the conversion of lawns to native vegetation (beneficial to wildlife) from local lawn ordinances.

100.3.2 State Land Acquisition Programs

100.3.2.1 Increase opportunities for habitat restoration by making any necessary policy changes to state, federal and local land acquisition programs (e.g., Green Acres, Blue Acres, etc.) to allow for acquisition within abandoned or failing bay shore communities, including mechanisms to relocate displaced people and infrastructure.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.2 Create a policy that requires the NJ DEP to incorporate scientific information regarding climate change and sea level rise (e.g., predictions, habitat management/acquisition efforts to enhance resilience to inundation) on their websites and to work with other government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

100.4.0.3 Develop policies for mandatory buffer strips on preserved farmlands and state-owned agricultural lands.

100.4.0.8 Develop a white paper addressing the impacts that existing, new or expanded rights-of-way have upon wildlife, wildlife habitats and habitat connectivity.

100.4.0.10 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.4.0.11 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.4.0.12 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.4.0.13 Develop policies for different circumstances (e.g., roadsides and medians, riparian, aquatic and terrestrial habitats) that outline appropriate habitat/vegetation management strategies and schedules to minimize risks to and benefit wildlife.

100.4.0.16 Develop policies to implement habitat management strategies that will increase the structural diversity surrounding areas used for energy, mining, and transportation and service corridors which include but are not limited to the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-

100.4.0.17 Develop policies to implement habitat management strategies, including prescribed burns, that will increase the structural diversity on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies to control and reduce the impacts of invasive, non-native species in order to increase structural habitat diversity.

100.4.0.18 Develop policies to minimize the extent of infrastructure associated with energy and service corridors or areas (e.g., wind and solar farms, pipelines, utility lines) and that require the implementation of habitat management strategies that will increase the structural diversity in the area including (e.g., the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides).

100.4.0.19 Develop regulations that will minimize the creation of new barriers, remove or replace current barriers with appropriately-sized systems to accommodate wildlife dispersal, and to minimize road widening and traffic volume increases within critical wildlife habitat areas.

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.24 Develop policies to provide financial support for the New Jersey Invasive Species Strike Team.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Leonard's Skipper

Focal species that comprise this Conservation Target:

Leonard's Skipper

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:
- 1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.1.1.2 Loss, alteration and/or degradation of habitat.
- 1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:
- 1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.2.1.2 Loss, alteration and/or degradation of habitat.
- 1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:
- 1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.3.1.2 Loss, alteration and/or degradation of habitat.
- 1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture (Avg. Score: 3.00)

NJ Specific Threats:
- 2.1.1.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.
- 2.1.1.5 Lack of competitive market prices to maintain native grasslands causes conversion to other crops that have more monetary value but less value as wildlife habitat.

2.1.2 Small-holder Farming (Avg. Score: 1.00)

NJ Specific Threats:
- 2.1.2.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.
- 2.1.2.2 Fragments terrestrial and aquatic habitats.

2.1.2.4 Agricultural practices (e.g., mechanized, row-crop agriculture) can cause direct mortality to wildlife when harvesting takes places.

2.1.2.5 Lack of competitive market prices to maintain native grasslands causes conversion to other crops that have more monetary value but less value as wildlife habitat.

2.1.3 Agro-industry (Avg. Score: 3.00)

NJ Specific Threats:

2.1.3.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.3.2 Fragments terrestrial and aquatic habitats.

2.1.3.5 Loss of ecotones by implementing clean farming (edge-to-edge) practices degrades habitat for early successional wildlife.

2.1.3.6 Lack of competitive market prices to maintain native grasslands causes conversion to other crops that have more monetary value but less value as wildlife habitat.

2.2 Wood and Pulp Plantations

2.2.1 Small Holder (Avg. Score: 1.00)

NJ Specific Threats:

2.2.1.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.2.2 Agro-industry Plantations (Avg. Score: 1.00)

NJ Specific Threats:

2.2.2.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.3 Livestock Farming and Ranching

2.3.2 Small-holder Grazing (Avg. Score: 1.00)

NJ Specific Threats:

2.3.2.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.2.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

2.3.2.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.2.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

2.3.3 Agro-industry Grazing (Avg. Score: 3.00)

NJ Specific Threats:

2.3.3.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.3.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

2.3.3.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.3.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

3 Energy Production and Mining

3.2 Mining and Quarrying

3.2.2 Surface Mining - Rock Quarry (and sand quarries) (Avg. Score: 1.00)

NJ Specific Threats:

3.2.2.1 Fragments terrestrial and aquatic habitats.

3.2.2.2 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

3.3 Renewable Energy

3.3.2 Solar Power (Avg. Score: 1.00)

NJ Specific Threats:

3.3.2.2 Loss, alteration and/or degradation of habitat.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads (Avg. Score: 1.00)

NJ Specific Threats: 4.2.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species, inhibiting dispersal of non-volant animals, reducing gene flow, and creating barriers to fish when service line-associated roads cross streams (e.g., bridges, culverts, fords, etc.).

4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

4.2.2 Management of rights-of-way or communication tower facilities and/or their associated access roads (Avg. Score: 3.00)

NJ Specific Threats: 4.2.2.1 Improper or poorly scheduled vegetation management can cause direct mortality to and may reduce productivity of wildlife.

5 Biological Resource Use

5.1 Hunting and Collecting Terrestrial Animals

5.1.1 Intentional Use (Avg. Score: 1.00)

NJ Specific Threats: 5.1.1.1 Illegal collection of wildlife can have detrimental impacts on populations.

5.2 Gathering Terrestrial Plants

5.2.3 Control (Avg. Score: 2.00)

NJ Specific Threats: 5.2.3.1 Alteration or control of undesirable plants or plant communities can destroy important food and nectar plants for native insects and animals.

5.3 Logging and Wood Harvesting

5.3.1 Intentional Use (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.1.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.1.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.1.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.1.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.1.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.1.6 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices in Atlantic White Cedar stands may destroy a unique wildlife wetland habitat that is difficult, and takes time, to restore.

5.3.2 Intentional Use (large scale) (Avg. Score: 1.00)

NJ Specific Threats:

5.3.2.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.2.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.2.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.2.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.2.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.2.6 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices in Atlantic White Cedar stands may destroy a unique wildlife wetland habitat that is difficult, and takes time, to restore.

5.3.3 Unintentional effects (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats:

5.3.3.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4 Unintentional effects (large scale) (Avg. Score: 1.00)

NJ Specific Threats:

5.3.4.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4.5 Lack of appropriate, sustainable forest management can lead to a decrease in forest habitat diversity, degraded habitat for many forest species, the loss of habitat for early-successional species, and/or the loss of unique habitats for species that need canopy breaks and multi-aged tree composition to fulfill various life history requirements.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized) (Avg. Score: 3.00)

NJ Specific Threats:

6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.

6.1.1.3 Increased risk of harassment that results in a change in wildlife behavior and/or direct mortality from vehicle strikes.

6.1.1.6 Off-road vehicles can be a mechanism of transference of wildlife diseases and invasive plant species if gear and apparel are not properly sanitized between sites.

7 Natural Systems Modifications

7.1 Fire and Fire Suppression

7.1.1 Increase in Fire Frequency/Intensity (Avg. Score: 3.00)

NJ Specific Threats:

7.1.1.1 Increase in frequency and intensity of wild fires as a result of droughts and heat waves drying out vegetation and litter.

7.1.1.2 Increase in frequency of wild fires as a result of illegal activities.

7.1.1.3 Unnatural fire regimes occurring as a result of military exercises.

7.1.1.4 Lack of diversity in age structure and composition of vegetation due to expansive, frequent fires.

7.1.2 Suppression of Fire Frequency/Intensity (Avg. Score: 3.00)

NJ Specific Threats: 7.1.2.1 Shift in vegetative communities as a result of suppression of natural fires.

7.1.2.2 Lack of diversity in age structure and composition of vegetation due to the suppression of fire.

7.3 Other Ecosystem Modifications

7.3.2 Inappropriate timing of mowing (Avg. Score: 3.00)

NJ Specific Threats: 7.3.2.1 Increased risk of direct mortality and/or reduced productivity of wildlife, as well as reduced use by migrating species.

7.3.4 Lack of natural disturbance patterns or ecosystem functions due to species loss (Avg. Score: 3.00)

NJ Specific Threats: 7.3.4.5 The lack of forest disturbance minimizes the diversity of herbaceous vegetation and other shrubs and trees that need a lot of sunlight to grow.

7.3.5 Poor habitat management (Avg. Score: 3.00)

NJ Specific Threats: 7.3.5.1 Improper or poorly scheduled maintenance of man-made corridors (e.g., roadsides and medians) can cause direct mortality to and may reduce productivity of wildlife.

7.3.5.3 Vegetation clearing removes terrestrial and riparian corridors for animal movement, shelter, and resting areas.

7.3.5.5 Habitat management that alters or removes vegetation without implementing long-term management increases the risk of invasive and exotic plants establishing themselves, outcompeting native vegetation.

7.3.5.6 Habitat management, including that which occurs on public and private lands, that does not consider timing and species' behaviors can result in the direct mortality and/or alteration or loss of habitat.

7.3.5.7 Improperly planned habitat management and/or mitigation efforts along roadsides and within the medians can attract wildlife and increase the risk of vehicle strikes.

7.3.5.12 Lack of diversity in age structure and composition of vegetation due to lack of natural disturbances and/or vegetation management.

7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

7.3.5.18 Lack of funding or competitive market prices to maintain native grasslands for grassland-dependent species causes conversion of fallow or hay fields to other crops or shrublands.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.1.1.1 Displace or outcompete native species for resources.

8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.

8.1.1.3 Invasive, non-native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

8.1.1.4 Invasive, non-native animals increase the risk of predation on native animals and/or herbivory on native vegetation.

8.1.1.5 Invasive, non-native animals and plants increase the risk of introduction and transference of diseases

8.1.1.6 Invasive, non-native plants may create physical barriers for some species.

8.1.4 Invasive non-native terrestrial/wetland animals (Avg. Score: 2.00)

NJ Specific Threats: 8.1.4.1 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.6 Invasive non-native fungal/bacterial diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.1.6.1 The introduction of non-native fungal and bacterial diseases threatens native populations and ecosystems.

8.2 Problematic Native Species/Diseases

8.2.2 Named Species (Avg. Score: 1.00)

NJ Specific Threats: 8.2.2.2 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.4 Problematic Species/Diseases of Unknown Origin

8.4.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.4.1.1 Non-native or poorly understood diseases and parasites could potentially impact native animals.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.3 Agricultural and Forestry Effluents

9.3.2 Soil Erosion and Sedimentation (Avg. Score: 1.00)

NJ Specific Threats: 9.3.2.2 Soil erosion and sedimentation limit the re-establishment of plants needed by terrestrial wildlife as cover and a food base.

9.3.3 Herbicides and Pesticides (Avg. Score: 3.00)

NJ Specific Threats: 9.3.3.1 Pesticides degrade terrestrial and aquatic habitats, especially streams, ponds and wetlands. Aquatic wildlife are particularly sensitive to these contaminants, which can cause developmental and behavioral abnormalities and reproductive failure. Some contaminants may bioaccumulate in predatory fish and birds and disrupt reproduction.

9.3.3.3 Use of pesticides can directly harm non-target species through direct contact and/or by reducing and/or contaminating their food supply.

9.3.3.4 Use of herbicides can destroy beneficial food and nectar plants for insects.

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture (Avg. Score: 3.00)

NJ Specific Threats: 9.3.5.1 Use of pesticides, insecticides, and/or herbicides can directly harm non-target species, such as amphibians and beneficial invertebrates through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5.2 Use of herbicides can destroy beneficial food and nectar plants for insects.

9.3.5.4 Improper use of current insecticides, such as those containing esfenvalerate, prallethrin, or piperonyl butoxide, or past use of pesticides containing chlordane still present in the soils, are toxic to various wildlife species, and can cause injury, mortality, or other effects that impair population viability.

9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.5 Air-Bourne Pollutants

9.5.4 Other (Avg. Score: 1.00)

NJ Specific Threats: 9.5.4.1 Dust and/or airborne sedimentation from construction sites, agricultural operations or related earth disturbances can introduce mineral or organic sediments into adjacent wildlife habitats, degrading their quality and suitability for wildlife short-term and/or long-term.

9.5.6 Herbicides and Pesticides (Avg. Score: 3.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 3.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.6 Phenology Shifting or Alteration

11.6.1 Phenology shifts related to pollination ecology (Avg. Score: 1.00)

NJ Specific Threats: 11.6.1.1 Alters inter-specific relationships of wildlife and vegetation, ultimately leading to detrimental impacts on the ecological system.

11.6.3 Phenology shifts related to species redistribution (Avg. Score: 1.00)

NJ Specific Threats: 11.6.3.1 Shifts in timing of species migration, breeding and hibernation, and available food resources, as a result of wildlife range shifts driven by climate change.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 3.00)

NJ Specific Threats: 12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.2 Lack of up-to-date existing information (Avg. Score: 3.00)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.3 Need to answer research question (Avg. Score: 3.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.4 Need to develop new technique (Avg. Score: 3.00)

NJ Specific Threats: 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 1.00)

NJ Specific Threats: 12.3.0.1 Regulatory habitat protections within state land use regulations are spatially limited to specific geographic areas (e.g., Pinelands, Coastal Area) or geographic features (e.g., wetlands, streams) and so fail to protect critical habitats that exist outside of these regulated areas.

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.9 Prescribed burns implemented by the NJ Forest Fire Service are constrained by State air quality regulations to a timeframe where seasonal weather conditions are less than ideal for effective burning. As a result, the Forest Fire Service is limited in the number of overall prescribed burns it can implement to restore habitat for wildlife.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 1.00)

NJ Specific Threats:

12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.

12.4.0.5 Bureau of Forest Fire Management policy has traditionally implemented prescribed burns on State lands for the sole purpose of public safety (i.e., addressing hazard fuel reduction), missing opportunities to burn in a manner that would additionally manage habitat for ecological diversity.

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 3.00)

NJ Specific Threats:

14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 3.00)

NJ Specific Threats:

14.2.1.1 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various forest management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 1.00)

NJ Specific Threats:

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.5 Secure and promote the protection/restoration of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through incentive programs.

1.2.1.6 Secure and promote the protection/restoration of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.9 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing Forestry Stewardship Programs.

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.12 Create incentives (non-monetary and/or monetary) for land developers to redevelop abandoned areas (e.g., shopping centers, office complexes) to minimize the loss of natural habitats and reduce the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.14 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of herbicides and pesticides, and implementing more ecologically safe strategies when using such products.

1.2.1.15 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of rodenticides, and implementing more ecologically safe strategies when using such products.

1.2.1.16 Create incentives (non-monetary and/or monetary) within State regulations (mitigations requirements or credit, BMP satisfaction, etc.) to promote the use of retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.17 Develop a public-relations oriented certification program for private retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.18 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and land managers to control and reduce the impacts of invasive, native and non-native species in order to increase structural habitat diversity.

1.2.1.19 Create incentives for federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to farmers, woodland landowners, and private landowners to adopt and/or endorse consistent BMPs concerning controlled burns to maintain and/or improve wildlife habitat.

1.2.1.20 Coordinate across government agencies and non-government organizations to create or expand upon tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMP's.

1.2.1.21 Create and/or support market-based programs that subsidize or create branding for products derived sustainably from managed wildlife habitats.

1.2.1.22 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to horse/livestock farm owners and managers to increase structural habitat diversity in and around the farms by managing vegetation for a variety of species, in particular, farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

1.2.1.23 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to provide cost shares and/or plan approvals for management based on management approaches and prescriptions.

1.2.1.24 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners, with habitat of suitable patch size to support breeding grassland-dependent species, to alter the timing of vegetation management to benefit grassland and pollinator species.

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

1.2.1.28 Create incentives to implement dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

2 Direct Management of Natural Resources

2.3 Fire management

2.3.2 Fuel reduction

2.3.2.1 Prevent wildfires by reducing natural fuel (e.g., leaf litter).

2.3.3 Prescribed burning

2.3.3.1 Evaluate different management techniques of prescribed burns that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

2.3.3.2 Conduct prescribed burning in Northern New Jersey forests to maintain and regenerate a mosaic of upland forest habitats.

2.3.3.3 Conduct prescribed burning to improve wildlife habitat.

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.1 Control invasive insect infestations by implementing BMP strategies through biological, chemical and/or mechanical means that will depress, or when appropriate, eradicate populations in a manner that avoids excessive harm to non-target species using BMPs to control infestations and limit their spread based on an inventory of invasive insect distribution and response to outbreaks.

2.8.0.2 Develop, implement, monitor and evaluate pest control/management strategies to reduce the impacts of over-abundant wildlife species (native and/or native, invasive species) on native vegetation and the degradation of habitats supporting SGCN. Over-abundant wildlife species include but are not limited to mute swans, Canada geese, beaver and white-tailed deer.

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.5 Implement biologically safe and appropriate control/management strategies, and where appropriate, eradication strategies to reduce the impacts and/or limit the distribution of invasive and/or non-native plant species within or near aquatic systems using methods that will provide the most protection to the aquatic and riparian ecological system, and minimize disturbance to the soil and wildlife. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.8.0.6 Implement long-term management of invasive and/or non-native plants to help maintain functioning ecological systems and biological diversity, and to enhance travel corridors. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.2 Improve the availability of prey/food resources through terrestrial and aquatic plantings and habitat restoration for SGCN populations, in particular for those populations thought to be limited due wholly or in part to a lack of (or contaminated) food resources, and for migratory species (birds, bats, invertebrates).

2.10.0.3 Restore and/or enhance habitats to benefit urban-associated SGCN.

2.10.0.4 Restore and/or enhance suitable travel corridors connecting conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.8 Protect significant natural and/or unique communities by implementing best management practices when conducting habitat restoration strategies.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.10 Minimize the loss of important habitats (e.g., coastal scrub-shrub and grassy habitats, high and low marsh habitats, etc.) that provide nesting, migrating, and wintering areas for SGCN birds and other coastal and marsh-dependent species through habitat restoration efforts.

2.10.0.11 Restore and/or enhance critical migratory terrestrial and aquatic habitats (e.g., beach, grasslands, forest, scrub-shrub, etc.) for songbirds, raptors, shorebirds, waterfowl, bats and invertebrates through habitat restoration efforts and expand habitat restoration to adjacent private lands to increase the effective size of the habitat.

2.10.0.12 Create and/or maintain scrub-shrub habitats through revegetation efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.15 Restore and/or enhance terrestrial and aquatic habitats proximate to but not adjacent to roads and other transportation corridors for terrestrial-bound SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.10.0.21 Restore and/or enhance understory habitats that suppress invasive species and provide critical resources and enhance sheltering, foraging, and nesting cover for wildlife.

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.11.0.3 Create suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats through vegetation management.

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through vegetation management.

2.11.0.6 Reclaim degraded rare species habitats by conducting vegetation management needed to restore habitat value for the documented/target SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.23 Implement appropriate habitat management actions in areas where natural disturbances, such as wildfire, have been precluded.

2.11.0.24 Conduct vegetation management adjacent to aquatic habitats following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.25 Conduct vegetation management along access roads following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.26 Conduct vegetation management along roadsides and medians, avoiding peak activity periods for wildlife, that enhances wildlife dispersal naturally and safely across roads and similar barriers to/between terrestrial and/or aquatic habitats.

2.11.0.27 Conduct vegetation management for target shrub- or young forest-dependent SGCN following BMPs to minimize the risk of the establishment of invasive and non-native plants.

2.11.0.28 Conduct vegetation management in agricultural areas following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.29 Conduct vegetation management on transportation and service corridors (i.e., rights-of-way) following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.30 Identify and prioritize areas where various management tools (such as increasing salinity through the management of water levels or chemical applications) may be effective in reducing phragmites within and restoring marsh habitat.

2.11.0.31 In areas where vegetative communities are shifting due to fire suppression and controlled burns are not feasible, manage vegetation to improve wildlife habitat.

2.11.0.32 Increase structural habitat diversity around and when feasible, within agricultural landscapes by managing vegetation for a variety of species, in particular, those farms that have removed scrub-shrub habitat and/or fragmented forests, and by implementing ecologically best practices (e.g., no-till farming, maintaining hedgerows, buffer set-asides, etc.).

2.11.0.33 Increase structural habitat diversity by implementing long-term vegetation management to minimize the potential for the establishment of invasive and/or non-native plants that may outcompete native vegetation.

2.11.0.34 Increase structural habitat diversity by managing residential, commercial and recreational areas' landscapes for a variety of species. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.

2.11.0.38 Increase structural habitat diversity in and around horse/livestock farms by managing vegetation for a variety of species, in particular, in and around farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

2.11.0.39 Increase structural habitat diversity in and around solar farms by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.40 Increase structural habitat diversity surrounding areas used for energy, mining, and transportation and service corridors by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides, and avoid managing habitat during the breeding seasons for ground-nesting birds, reptiles, amphibians and small mammals.

2.11.0.41 Increase structural habitat diversity through the implementation of a variety of vegetation management practices such a prescribed burns (either increasing or decreasing their frequency depending on the site and objective), plantings, etc. that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.42 Increase structural habitat diversity within wind farms for terrestrial bound and low-flying species and around wind farms for other wildlife by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.43 Manage forests to increase variation in age structure and composition using BMPs that promote and maintain functioning ecological forest-based systems and biological diversity.

2.11.0.45 Regularly and/or rotationally create young forest habitat in targeted areas to maintain and regenerate a mosaic of upland forest habitats that will benefit shrub- and young forest-dependent species.

2.14 Wildlife disease management

2.14.0 Wildlife disease strategy development and investigation

2.14.0.1 Investigate diseases/pathogens impacting SGCN and/or their habitats.

2.14.0.2 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

2.14.0.3 Protect SGCN from exotic pathogen introduction or incident through implementation of a "rapid response plan"; DFW to give priority attention to these species in planning and/or implementing a response.

2.14.0.4 Conduct long-term monitoring of diseases in vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts.

2.14.0.5 Assess the impacts of diseases on the life cycles of wildlife.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.14 Identify areas with invasive, aquatic plants and animals and collect a detailed baseline assessment of the species' status and distribution. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort. Researchers and contractors performing Forest Stewardship Inventories and/or Plans on state lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.0.0.15 Conduct long-term monitoring of areas identified as having invasive, aquatic plants and animals to track the species' status/progress over time with or without the implementation of management strategies. Areas without management strategies should be assessed and prioritized for management/control. Areas where management strategies are being implemented should include an assessment of the management effort and identify/recommend and implement necessary changes to improve its success. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort.

3.0.0.26 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species including objectives and guidance pertaining to and the condition/status of critical and supporting habitats.

3.0.0.27 Evaluate the effectiveness of strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals through research and monitoring. Develop and provide NJ DEP and other appropriate governing agencies/commissions a summary of findings and recommendations to improve such efforts.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.7 Track (via a database that includes a GIS component) and research problematic species and diseases to determine their distribution, impacts on SGCN wildlife/wildlife communities, and develop potential control measures.

3.2.0.8 Implement and conduct long-term monitoring of control measures aimed at minimizing the impacts of problematic species and/or diseases to evaluate the effectiveness of such efforts and to identify and incorporate additional strategies as appropriate.

3.2.0.18 Conduct baseline surveys/inventories to better understand the distribution of fish and invertebrate (including freshwater mussels) populations.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.2 Age, size and sex structure

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.3 Baseline inventory

3.2.3.9 Investigate hazardous environmental issues that may impact grassland invertebrates.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.6 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) that could, through revegetation and/or enhancement efforts, become suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN.

3.3.1.7 Map and prioritize existing and potential areas for early succession forest management. Share the results with state, county and municipal planners.

3.3.1.8 Assess the availability and suitability of forest habitats for SGCN species (particularly reptiles and amphibians, birds, pollinators, and tiger beetles) in southern forests since Superstorm Sandy.

3.3.1.9 Inventory forests throughout northern New Jersey to develop a baseline characterization of the structure and composition of habitats and identify deficient forest habitat types.

3.3.1.10 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and document fish SGCN habitats by plotting their distributions in GIS and submitting the data to the State for integration into the DEP's Biotics database.

3.3.1.16 Gather "best information" for spatial modeling and update/create a current model/depiction of anticipated habitat shifts from sea-level rise, flooding, etc.

3.3.1.17 Identify and map undeveloped roads and trails in all conserved forests, and create a database of locations. Integrate information regarding potentially sensitive areas.

3.3.1.18 Conduct an assessment using available data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels.

3.3.1.19 Identify and codify legal ORV access areas on state (and if appropriate, other conserved) lands. Provide GIS mapping to the landowner for potential use in directing such recreational activities.

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.2 Monitoring

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.8 Evaluate the effectiveness of current prescribed burning practices on Pinelands dependent species.

3.3.2.10 Evaluate the efficacy and success of different management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.3.2.11 Evaluate and compare the effectiveness of delayed mowing of warm season grass fields versus cool season hay fields to benefit grassland-dependent species.

3.3.2.12 Evaluate and compare the effectiveness of different management techniques (e.g., prescribed burning, mowing, brush-hogging, etc.) for maintaining suitable habitat for grassland-dependent species and species dependent upon early successional habitats.

3.3.2.13 Evaluate the effectiveness of management strategies (e.g., timing restrictions for mowing, cooperative agreements with utility companies for maintenance of rights-of-ways) that maintain and enhance large existing areas of grassland in perpetuity. Focus on habitat patches that can be managed to enhance the total size of suitable grassland habitat and create interspersed early-successional habitat.

3.3.2.15 Investigate the effectiveness of management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.3.2.20 Once a system is developed for reporting and qualifying new locations of invasive species, develop, implement and monitor/evaluate invasive species removal strategies at identified locations. Priority should be given to those areas critical to SGCN and/or contain unique and/or rare plant communities supporting SGCN and/or other fish/wildlife species.

3.3.2.24 Conduct regular inventories of forests throughout northern New Jersey to characterize the changing structure and composition of habitats and monitor forest conditions.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.3 Develop/improve management techniques that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.9 Develop strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.3.16 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.3.19 Work with foresters to develop prescribed burning practices for Pinelands dependent species that increase or maintain habitat quality for these species in the Pinelands.

3.5.3.21 Develop management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.22 Identify (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) and modify management strategies (e.g., timing restrictions for mowing, cooperative agreements with utility companies for maintenance of rights-of-ways), based on research, that maintain and enhance large existing areas of grassland in perpetuity.

3.5.3.24 Based on research, modify management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.3.29 Explore the use of alternative vegetation (i.e., commodity crops) to address agriculture concerns.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.5 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

3.5.4.6 Investigate the feasibility of mitigating for the impacts of contaminants to vulnerable wildlife, particularly SGCN. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.5.4.14 Develop and implement agreements, and update existing agreements, with government agencies regarding the protection of critical SGCN habitats (e.g., significant breeding populations of beach nesting birds, colonial waterbird nesting areas, bat colonies, etc.).

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.18 Investigate the effectiveness of survey techniques through selected “ground truthing” and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

3.5.4.21 Develop BMPs to address problematic species and diseases of unknown origin.

4 Education

4.1 Educator/Instructor training

4.1.0 Public education

4.1.0.1 Provide educational resources and training programs to private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

5 Facilities and Areas

5.15 Wildlife Management Areas

5.15.6 Roads

5.15.6.1 Clearly post areas/roads where vehicle access is permitted.

5.15.6.2 Clearly post areas/trails where vehicle access is not permitted.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.7 Secure and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.8 Secure and protect scrub-shrub habitats for SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.8 Promote the protection of scrub-shrub habitats for SGCN through conservation area designations.

6.4 Private lands agreements

6.4.0 Private land agreement strategies

6.4.0.1 Enter into private lands agreements to expand control burns on private lands, in particular those adjacent to conserved lands to improve SGCN habitats.

7 Law Enforcement

7.1 Law enforcement

7.1.3 Sub-national Level

7.1.3.2 Increase the number of law enforcement officers tending to wildlife issues to a reasonable number to sufficiently cover the State and marine waters.

7.1.4 Scale Unspecified

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.26 Educate law enforcement personnel that there may be unauthorized research projects taking place and to encourage them to investigate any activities that appear to be harmful to wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.2 Develop a team of personnel from government entities, conservation organizations and other stakeholders engaged in oil/gas spill response for marine and freshwater habitats to develop a feasible plan for oil spill response and/or to amend NJ's current oil spill response plan that clearly outlines each organizations responsibilities and an assessment and location list of available equipment for boom deployment during oil spills.

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.1.0.4 Engage government agencies, conservation partners and other stakeholders in constructive dialogues encouraging them to influence policy change and the creation of incentives through a habitat bill and/or municipal ordinances for backyard habitat.

8.1.0.15 Engage government agencies, conservation partners and other stakeholders in discussions encouraging and supporting the creation of laws and policies requiring vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

8.1.0.16 Engage local governments in discussions regarding the importance of them adopting/passing ordinances which require assessing and addressing secondary impacts (i.e., ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

8.1.0.17 Engage municipalities in constructive dialogue to identify and minimize destruction of areas prioritized for early succession forest management.

8.1.0.18 Engage NJDOT, NJ Transit Authority and other road management entities, wildlife conservation organizations/agencies (e.g., Division of Fish and Wildlife, New Jersey Conservation Foundation, Conserve Wildlife Foundation of NJ), and communities and citizens in discussions regarding the importance of and methods to enhance habitat connectivity, and work together to develop feasible strategies for ensuring that wildlife can disperse naturally and safely across roads and similar barriers to terrestrial and/or aquatic habitats.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.20 Organize a small focal group of government and non-government agencies/organizations responsible for decisions regarding beach/dune management to share and coordinate their goals so that comprehensive planning can attempt to meet all needs.

8.1.0.21 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation human-subsidized and/or overabundant, native species cause to local nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.22 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation invasive species cause to native nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.26 Coordinate across federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to woodland landowners to adopt or endorse consistent best management practices concerning controlled burns to maintain and/or improve forested habitat for wildlife.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.34 Work with the NJ Education Association and Department of Education to design curriculum and outdoor experimental learning opportunities, and provide training to teachers on implementation of these activities.

8.1.0.37 Enlist landowners and NJ citizens in the protection of and survey efforts for SGCN, in particular rare species, by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management and wildlife-related volunteer programs.

8.1.0.38 Engage partners, stakeholders and land managers in constructive dialogue promoting forest stewardship for SGCN that use core forests and forested corridors.

8.1.0.40 Encourage researchers, land managers, naturalists and enthusiasts to follow proper procedures for the coordination and/or permitting of research/management activities involving wildlife and sensitive habitats, and discourage activities that alter vegetation or wetlands, or cause harm or disturbance to wildlife.

8.1.0.42 Engage citizens, wildlife observers and photographers through discussions and distributable information regarding the importance of and encouraging implementing responsible and ethical behavior when observing wildlife by developing an alliance of wildlife photographers and widely circulating recommendations on how to reduce impact.

8.1.0.44 Engage conservation partners, stakeholders, government agencies and other land stewards in constructive dialogues encouraging their inclusion of controlled burns in forest and other stewardship plans.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.1.0.48 Form cooperative partnerships with transportation and shipment agencies and companies to facilitate habitat creation and enhancement away from and outside of project areas and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.2 Recruitment and retention activities

8.2.3 For wildlife watching

8.2.3.1 Develop and implement nature-focused tourism opportunities including wildlife viewing sites, interpretive signage highlighting unique ecosystems/habitats, and wildlife-related recreational opportunities that do not negatively impact SGCN or their habitats.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.7 Develop and provide (or otherwise make publicly available) educational programs and/or materials that describe the negative impacts of off-road vehicles and watercraft use in and adjacent to critical SGCN habitats, and the importance of confining such activities to more appropriate locations and/or seasons.

8.3.0.8 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate recreationists and encourage landowners to eliminate garbage in the vicinity of suitable wildlife habitat, in particular SGCN habitat. Information should include the detrimental impacts garbage may have on various wildlife species.

8.3.0.9 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners and land managers to include only native plants in landscaping and restoration projects. Provide information to assist them in detecting problematic establishment of invasive, non-indigenous plants.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.11 Develop and provide (or otherwise make publicly available) educational programs and/or materials to the public, wildlife-related professionals, foresters, etc., that describe the value of species that are often feared (e.g., snakes, bats, spiders, Allegheny woodrat) and/or deemed a "nuisance" (e.g., squirrel, deer, snapping turtle), and therefore, persecuted by people. Include information on tolerance, proper identification, eviction from human dwellings, how to minimize the animal's presence on the property, and/or how to live in harmony with the animal.

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.24 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

8.3.0.25 Develop educational outreach programs for landowners, nurseries and the general public regarding the negative impacts of invasive and non-native plants on our natural communities.

8.3.0.26 Develop educational outreach programs for private and public landowners and land managers regarding the importance of and how to manage core forests and forested corridors in a way that will be beneficial for SGCN, particularly endangered, threatened and special concern species.

8.3.0.27 Develop educational outreach programs for public and private landowners and land managers regarding the importance of structural habitat diversity, methods to increase diversity, and/or incentive programs available to increase habitat diversity.

8.3.0.28 Develop educational outreach programs for public and private landowners and land managers regarding the importance of managing grasslands for grassland-dependent species, methods of management, and/or incentive programs available.

8.3.0.30 Develop educational outreach programs for private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.5 Develop a plan that directs the creation or expansion of energy or utility rights-of-way in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.6 Develop a plan that directs the creation or expansion of roads and railroads or the re-establishment of abandoned railroads within and adjacent to critical forested habitats in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.8 Develop a plan that focuses on strategies for oil pipelines to avoid sensitive habitats that would be highly impacted by oil spills.

9.1.0.9 Develop a plan that focuses on strategies to minimize the creation of renewable energy farms (e.g., solar, wind) and related infrastructures within and their impacts on forested habitats and the wildlife community.

9.1.0.10 Develop a plan that focuses on strategies to minimize the impacts of mining on critical forested habitats.

9.1.0.11 Develop a plan that focuses on strategies to minimize the impacts of power plants on critical forested habitats and the wildlife community.

9.1.0.13 Develop a plan to minimize agriculture that would result in groundwater withdrawal in critical forested areas.

9.1.0.15 Develop a plan to minimize fragmentation of terrestrial and aquatic habitats by roads.

9.1.0.16 Develop a plan to minimize new lawnscapes and preserve natural vegetation within and adjacent to critical forest areas.

9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

9.1.0.21 Develop a plan to minimize the use of any-sized dam in critical forested areas.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.2 Organizational strategic and CMS planning

9.2.1 Organizational strategic and operational planning

9.2.1.1 Identify and codify legal ORV access areas on state lands.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.5 Develop response plans to address disease outbreaks within wildlife populations, in particular SGCN.

9.3.1.7 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.10 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.15 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.1.16 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3 Habitat management planning

9.3.3.5 Develop a management plan using forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

9.3.3.7 Develop a management plan to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

9.3.3.8 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.3.13 Develop a management plan that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas and prevents or ameliorates near-term impacts of climate change throughout the State, but in particular within the coastal and Delaware Bay areas.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.16 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.3.17 Develop a management plan for prescribed burning that will benefit Pinelands dependent species and increase or maintain habitat quality for these species in the Pinelands.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.21 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.3.26 Develop a management plan for parcels of suitable size to be managed for native herbaceous plant species that support breeding grassland dependent species.

9.3.3.28 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.3.29 Develop habitat management plans aimed at reducing or eliminating negative impacts of ORVs.

9.3.3.32 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3.34 Include controlled burn prescriptions in forest and stewardship plans to improve wildlife habitat.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

- 11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.
- 11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.
- 11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.
- 11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.
- 11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.
- 11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.
- 11.1.1.12 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed solar farm projects to reduce habitat fragmentation and minimize impacts on wildlife.

11.1.2 Review of proposed policies and plans

- 11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

- 11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.
- 11.2.0.2 Provide technical support to public and private landowners and land managers for controlling invasive, native and non-native plant species in order to increase structural habitat diversity.
- 11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.
- 11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.7 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on the importance of maintaining habitat connectivity, minimizing fragmentation, and the use of CHANJ products to help them target areas for such planning.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.11 Provide educational resources, training programs, and on-the-ground guidance to private and public landowners and land managers on the benefits of and for creating young forest and early succession habitat for SGCN.

11.2.0.12 Provide educational resources and technical support to public landowners and land managers for managing grasslands for grassland-dependent species.

11.2.0.15 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and landowners about the importance of retaining and in an effort to protect, create, enhance and/or restore vegetation along aquatic habitats.

11.2.0.17 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of vernal pools and the protection, enhancement and/or restoration of biologically appropriate buffers.

11.2.0.22 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

11.2.0.23 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to SGCN habitats to promote the protection and/or enhancement of those adjacent habitats to increase the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and that connect conserved SGCN habitats.

11.2.0.24 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers on how to manage vegetated roadside areas (e.g., mowing, brush-hogging, etc.) on a schedule that avoids peak activity periods for wildlife and therefore, minimizes harm.

11.2.0.25 Provide educational resources, training programs, and on-the-ground guidance to resource managers regarding the assessment of and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) related to residential and commercial development.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.1 Engage partners and stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.3 Provide educational resources, training programs, and on-the-ground guidance to DOD to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop and implement forest management and other practices that minimize disturbances to SGCN (i.e., beyond their federal requirements).

11.2.1.5 Provide educational resources, training programs, and on-the-ground guidance to municipalities, state and federal agency resource managers on tasks such as writing and integrating Beach Management Plans into other management documents.

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

11.2.2 With private landowners

11.2.2.1 Provide technical support to farming operations and woodland landowners on ways to decrease clean farming (edge-to-edge) practices and create ecotones to benefit bobwhite and other species dependent on early successional habitat.

100 Law and Policy

100. Legislation

100.1.2 National Level

100.1.2.1 Create legislation to establish markets for warm-season grasses to increase the permanency of this crop on the landscape.

100.1.3 Sub-national Level

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.4 County and Local

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.3 Expand the acreages and enhance the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN through local ordinances.

100.1.4.14 Adopt/pass local ordinances which require assessing and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100.1.5.5 Develop legislation to provide financial support for the New Jersey Invasive Species Strike Team.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.5 Develop policies that will promote improved and secure habitat connections between conserved SGCN habitats.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.12 Develop policies that promote the preservation and protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.23 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.24 Create legislation to establish markets for warm-season grasses to increase the permanency of this crop on the landscape.

100.3.0.31 Create or expand tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMPs.

100.3.0.32 Coordinate regulations across agencies to maximize availability of and enrollment in existing Forestry Stewardship Programs (e.g., "Woodland Stewards", Farm Bill, partners, etc.) to maintain and/or improve forest habitat.

100.3.0.38 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.3.0.39 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.3.0.40 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.45 Increase the controlled burn season to focus on restoring vegetative communities.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.48 Propose new State law or regulation mandating that a State-level "development impact fee" be assessed on all new development approved by municipalities (via the Municipal Land Use Law processes), and dedicate such monies to the development and implementation of regional Habitat Conservation Plans (or existing plans/programs serving the same regional function).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.53 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded rights-of-way corridors associated with energy transport/transmission.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100.3.0.73 Develop regulations that would exempt the conversion of lawns to native vegetation (beneficial to wildlife) from local lawn ordinances.

100.3.2 State Land Acquisition Programs

100.3.2.1 Increase opportunities for habitat restoration by making any necessary policy changes to state, federal and local land acquisition programs (e.g., Green Acres, Blue Acres, etc.) to allow for acquisition within abandoned or failing bay shore communities, including mechanisms to relocate displaced people and infrastructure.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.2 Create a policy that requires the NJ DEP to incorporate scientific information regarding climate change and sea level rise (e.g., predictions, habitat management/acquisition efforts to enhance resilience to inundation) on their websites and to work with other government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

100.4.0.3 Develop policies for mandatory buffer strips on preserved farmlands and state-owned agricultural lands.

100.4.0.8 Develop a white paper addressing the impacts that existing, new or expanded rights-of-way have upon wildlife, wildlife habitats and habitat connectivity.

100.4.0.10 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.4.0.11 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.4.0.12 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.4.0.13 Develop policies for different circumstances (e.g., roadsides and medians, riparian, aquatic and terrestrial habitats) that outline appropriate habitat/vegetation management strategies and schedules to minimize risks to and benefit wildlife.

100.4.0.14 Develop policies to facilitate agreements between eligible entities to manage appropriate conserved lands for grassland-dependent species, and to have access to/obtain restoration funds.

100.4.0.16 Develop policies to implement habitat management strategies that will increase the structural diversity surrounding areas used for energy, mining, and transportation and service corridors which include but are not limited to the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-

100.4.0.17 Develop policies to implement habitat management strategies, including prescribed burns, that will increase the structural diversity on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies to control and reduce the impacts of invasive, non-native species in order to increase structural habitat diversity.

100.4.0.18 Develop policies to minimize the extent of infrastructure associated with energy and service corridors or areas (e.g., wind and solar farms, pipelines, utility lines) and that require the implementation of habitat management strategies that will increase the structural diversity in the area including (e.g., the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides).

100.4.0.19 Develop regulations that will minimize the creation of new barriers, remove or replace current barriers with appropriately-sized systems to accommodate wildlife dispersal, and to minimize road widening and traffic volume increases within critical wildlife habitat areas.

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.24 Develop policies to provide financial support for the New Jersey Invasive Species Strike Team.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Maritime Sunflower Borer Moth

Focal species that comprise this Conservation Target:

Maritime Sunflower Borer Moth

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:
- 1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.1.1.2 Loss, alteration and/or degradation of habitat.
- 1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:
- 1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.2.1.2 Loss, alteration and/or degradation of habitat.
- 1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:
- 1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.3.1.2 Loss, alteration and/or degradation of habitat.
- 1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture (Avg. Score: 3.00)

NJ Specific Threats:
- 2.1.1.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.
- 2.1.1.5 Lack of competitive market prices to maintain native grasslands causes conversion to other crops that have more monetary value but less value as wildlife habitat.

2.1.2 Small-holder Farming (Avg. Score: 1.00)

NJ Specific Threats:
- 2.1.2.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.
- 2.1.2.2 Fragments terrestrial and aquatic habitats.

2.1.2.4 Agricultural practices (e.g., mechanized, row-crop agriculture) can cause direct mortality to wildlife when harvesting takes places.

2.1.2.5 Lack of competitive market prices to maintain native grasslands causes conversion to other crops that have more monetary value but less value as wildlife habitat.

2.1.3 Agro-industry (Avg. Score: 3.00)

NJ Specific Threats:

2.1.3.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.3.2 Fragments terrestrial and aquatic habitats.

2.1.3.5 Loss of ecotones by implementing clean farming (edge-to-edge) practices degrades habitat for early successional wildlife.

2.1.3.6 Lack of competitive market prices to maintain native grasslands causes conversion to other crops that have more monetary value but less value as wildlife habitat.

2.2 Wood and Pulp Plantations

2.2.1 Small Holder (Avg. Score: 1.00)

NJ Specific Threats:

2.2.1.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.2.2 Agro-industry Plantations (Avg. Score: 1.00)

NJ Specific Threats:

2.2.2.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.3 Livestock Farming and Ranching

2.3.2 Small-holder Grazing (Avg. Score: 1.00)

NJ Specific Threats:

2.3.2.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.2.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

2.3.2.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.2.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

2.3.3 Agro-industry Grazing (Avg. Score: 3.00)

NJ Specific Threats:

2.3.3.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.3.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

2.3.3.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.3.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

3 Energy Production and Mining

3.2 Mining and Quarrying

3.2.2 Surface Mining - Rock Quarry (and sand quarries) (Avg. Score: 1.00)

NJ Specific Threats:

3.2.2.1 Fragments terrestrial and aquatic habitats.

3.2.2.2 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

3.3 Renewable Energy

3.3.2 Solar Power (Avg. Score: 1.00)

NJ Specific Threats:

3.3.2.2 Loss, alteration and/or degradation of habitat.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads (Avg. Score: 1.00)

NJ Specific Threats: 4.2.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species, inhibiting dispersal of non-volant animals, reducing gene flow, and creating barriers to fish when service line-associated roads cross streams (e.g., bridges, culverts, fords, etc.).

4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

4.2.2 Management of rights-of-way or communication tower facilities and/or their associated access roads (Avg. Score: 3.00)

NJ Specific Threats: 4.2.2.1 Improper or poorly scheduled vegetation management can cause direct mortality to and may reduce productivity of wildlife.

5 Biological Resource Use

5.1 Hunting and Collecting Terrestrial Animals

5.1.1 Intentional Use (Avg. Score: 1.00)

NJ Specific Threats: 5.1.1.1 Illegal collection of wildlife can have detrimental impacts on populations.

5.2 Gathering Terrestrial Plants

5.2.3 Control (Avg. Score: 2.00)

NJ Specific Threats: 5.2.3.1 Alteration or control of undesirable plants or plant communities can destroy important food and nectar plants for native insects and animals.

5.3 Logging and Wood Harvesting

5.3.1 Intentional Use (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.1.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.1.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.1.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.1.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.1.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.1.6 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices in Atlantic White Cedar stands may destroy a unique wildlife wetland habitat that is difficult, and takes time, to restore.

5.3.2 Intentional Use (large scale) (Avg. Score: 1.00)

NJ Specific Threats:

5.3.2.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.2.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.2.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.2.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.2.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.2.6 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices in Atlantic White Cedar stands may destroy a unique wildlife wetland habitat that is difficult, and takes time, to restore.

5.3.3 Unintentional effects (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats:

5.3.3.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4 Unintentional effects (large scale) (Avg. Score: 1.00)

NJ Specific Threats:

5.3.4.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4.5 Lack of appropriate, sustainable forest management can lead to a decrease in forest habitat diversity, degraded habitat for many forest species, the loss of habitat for early-successional species, and/or the loss of unique habitats for species that need canopy breaks and multi-aged tree composition to fulfill various life history requirements.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized) (Avg. Score: 3.00)

NJ Specific Threats:

6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.

6.1.1.3 Increased risk of harassment that results in a change in wildlife behavior and/or direct mortality from vehicle strikes.

6.1.1.6 Off-road vehicles can be a mechanism of transference of wildlife diseases and invasive plant species if gear and apparel are not properly sanitized between sites.

7 Natural Systems Modifications

7.1 Fire and Fire Suppression

7.1.1 Increase in Fire Frequency/Intensity (Avg. Score: 2.00)

NJ Specific Threats:

7.1.1.1 Increase in frequency and intensity of wild fires as a result of droughts and heat waves drying out vegetation and litter.

7.1.1.2 Increase in frequency of wild fires as a result of illegal activities.

7.1.1.3 Unnatural fire regimes occurring as a result of military exercises.

7.1.1.4 Lack of diversity in age structure and composition of vegetation due to expansive, frequent fires.

7.1.2 Suppression of Fire Frequency/Intensity (Avg. Score: 2.00)

NJ Specific Threats: 7.1.2.1 Shift in vegetative communities as a result of suppression of natural fires.

7.1.2.2 Lack of diversity in age structure and composition of vegetation due to the suppression of fire.

7.3 Other Ecosystem Modifications

7.3.2 Inappropriate timing of mowing (Avg. Score: 3.00)

NJ Specific Threats: 7.3.2.1 Increased risk of direct mortality and/or reduced productivity of wildlife, as well as reduced use by migrating species.

7.3.4 Lack of natural disturbance patterns or ecosystem functions due to species loss (Avg. Score: 3.00)

NJ Specific Threats: 7.3.4.5 The lack of forest disturbance minimizes the diversity of herbaceous vegetation and other shrubs and trees that need a lot of sunlight to grow.

7.3.5 Poor habitat management (Avg. Score: 3.00)

NJ Specific Threats: 7.3.5.1 Improper or poorly scheduled maintenance of man-made corridors (e.g., roadsides and medians) can cause direct mortality to and may reduce productivity of wildlife.

7.3.5.2 Shifting from natural vegetation to lawns can cause increased temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

7.3.5.3 Vegetation clearing removes terrestrial and riparian corridors for animal movement, shelter, and resting areas.

7.3.5.4 Vegetation clearing or inappropriate alteration adjacent to aquatic habitats threatens aquatic species by degrading habitat and water quality (altering temperature and dissolved oxygen, increasing siltation and desiccation, etc.).

7.3.5.5 Habitat management that alters or removes vegetation without implementing long-term management increases the risk of invasive and exotic plants establishing themselves, outcompeting native vegetation.

7.3.5.6 Habitat management, including that which occurs on public and private lands, that does not consider timing and species' behaviors can result in the direct mortality and/or alteration or loss of habitat.

7.3.5.12 Lack of diversity in age structure and composition of vegetation due to lack of natural disturbances and/or vegetation management.

7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

7.3.5.18 Lack of funding or competitive market prices to maintain native grasslands for grassland-dependent species causes conversion of fallow or hay fields to other crops or shrublands.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.1.1.1 Displace or outcompete native species for resources.

8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.

8.1.1.3 Invasive, non-native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

8.1.1.4 Invasive, non-native animals increase the risk of predation on native animals and/or herbivory on native vegetation.

8.1.1.5 Invasive, non-native animals and plants increase the risk of introduction and transference of diseases

8.1.1.6 Invasive, non-native plants may create physical barriers for some species.

8.1.4 Invasive non-native terrestrial/wetland animals (Avg. Score: 2.00)

NJ Specific Threats: 8.1.4.1 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.6 Invasive non-native fungal/bacterial diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.1.6.1 The introduction of non-native fungal and bacterial diseases threatens native populations and ecosystems.

8.2 Problematic Native Species/Diseases

8.2.2 Named Species (Avg. Score: 1.00)

NJ Specific Threats: 8.2.2.2 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.4 Problematic Species/Diseases of Unknown Origin

8.4.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.4.1.1 Non-native or poorly understood diseases and parasites could potentially impact native animals.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.3 Agricultural and Forestry Effluents

9.3.3 Herbicides and Pesticides (Avg. Score: 3.00)

NJ Specific Threats: 9.3.3.1 Pesticides degrade terrestrial and aquatic habitats, especially streams, ponds and wetlands. Aquatic wildlife are particularly sensitive to these contaminants, which can cause developmental and behavioral abnormalities and reproductive failure. Some contaminants may bioaccumulate in predatory fish and birds and disrupt reproduction.

9.3.3.3 Use of pesticides can directly harm non-target species through direct contact and/or by reducing and/or contaminating their food supply.

9.3.3.4 Use of herbicides can destroy beneficial food and nectar plants for insects.

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture (Avg. Score: 3.00)

NJ Specific Threats: 9.3.5.1 Use of pesticides, insecticides, and/or herbicides can directly harm non-target species, such as amphibians and beneficial invertebrates through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5.2 Use of herbicides can destroy beneficial food and nectar plants for insects.

9.3.5.4 Improper use of current insecticides, such as those containing esfenvalerate, prallethrin, or piperonyl butoxide, or past use of pesticides containing chlordane still present in the soils, are toxic to various wildlife species, and can cause injury, mortality, or other effects that impair population viability.

9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.5 Air-Bourne Pollutants

9.5.4 Other (Avg. Score: 1.00)

NJ Specific Threats: 9.5.4.1 Dust and/or airborne sedimentation from construction sites, agricultural operations or related earth disturbances can introduce mineral or organic sediments into adjacent wildlife habitats, degrading their quality and suitability for wildlife short-term and/or long-term.

9.5.6 Herbicides and Pesticides (Avg. Score: 3.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 3.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.6 Phenology Shifting or Alteration

11.6.1 Phenology shifts related to pollination ecology (Avg. Score: 1.00)

NJ Specific Threats: 11.6.1.1 Alters inter-specific relationships of wildlife and vegetation, ultimately leading to detrimental impacts on the ecological system.

11.6.3 Phenology shifts related to species redistribution (Avg. Score: 1.00)

NJ Specific Threats: 11.6.3.1 Shifts in timing of species migration, breeding and hibernation, and available food resources, as a result of wildlife range shifts driven by climate change.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 3.00)

NJ Specific Threats: 12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.2 Lack of up-to-date existing information (Avg. Score: 3.00)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.3 Need to answer research question (Avg. Score: 3.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.4 Need to develop new technique (Avg. Score: 3.00)

NJ Specific Threats: 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 1.00)

NJ Specific Threats:

12.3.0.1 Regulatory habitat protections within state land use regulations are spatially limited to specific geographic areas (e.g., Pinelands, Coastal Area) or geographic features (e.g., wetlands, streams) and so fail to protect critical habitats that exist outside of these regulated areas.

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.9 Prescribed burns implemented by the NJ Forest Fire Service are constrained by State air quality regulations to a timeframe where seasonal weather conditions are less than ideal for effective burning. As a result, the Forest Fire Service is limited in the number of overall prescribed burns it can implement to restore habitat for wildlife.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 1.00)

NJ Specific Threats:

12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.

12.4.0.5 Bureau of Forest Fire Management policy has traditionally implemented prescribed burns on State lands for the sole purpose of public safety (i.e., addressing hazard fuel reduction), missing opportunities to burn in a manner that would additionally manage habitat for ecological diversity.

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 3.00)

NJ Specific Threats:

14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 3.00)

NJ Specific Threats:

14.2.1.1 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various forest management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 1.00)

NJ Specific Threats: 15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.5 Secure and promote the protection/restoration of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through incentive programs.

1.2.1.6 Secure and promote the protection/restoration of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.9 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing Forestry Stewardship Programs.

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.12 Create incentives (non-monetary and/or monetary) for land developers to redevelop abandoned areas (e.g., shopping centers, office complexes) to minimize the loss of natural habitats and reduce the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.14 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of herbicides and pesticides, and implementing more ecologically safe strategies when using such products.

1.2.1.15 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of rodenticides, and implementing more ecologically safe strategies when using such products.

1.2.1.16 Create incentives (non-monetary and/or monetary) within State regulations (mitigations requirements or credit, BMP satisfaction, etc.) to promote the use of retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.17 Develop a public-relations oriented certification program for private retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.18 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and land managers to control and reduce the impacts of invasive, native and non-native species in order to increase structural habitat diversity.

1.2.1.19 Create incentives for federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to farmers, woodland landowners, and private landowners to adopt and/or endorse consistent BMPs concerning controlled burns to maintain and/or improve wildlife habitat.

1.2.1.20 Coordinate across government agencies and non-government organizations to create or expand upon tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMP's.

1.2.1.21 Create and/or support market-based programs that subsidize or create branding for products derived sustainably from managed wildlife habitats.

1.2.1.22 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to horse/livestock farm owners and managers to increase structural habitat diversity in and around the farms by managing vegetation for a variety of species, in particular, farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

1.2.1.23 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to provide cost shares and/or plan approvals for management based on management approaches and prescriptions.

1.2.1.24 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners, with habitat of suitable patch size to support breeding grassland-dependent species, to alter the timing of vegetation management to benefit grassland and pollinator species.

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

1.2.1.28 Create incentives to implement dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

2 Direct Management of Natural Resources

2.3 Fire management

2.3.2 Fuel reduction

2.3.2.1 Prevent wildfires by reducing natural fuel (e.g., leaf litter).

2.3.3 Prescribed burning

2.3.3.1 Evaluate different management techniques of prescribed burns that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

2.3.3.2 Conduct prescribed burning in Northern New Jersey forests to maintain and regenerate a mosaic of upland forest habitats.

2.3.3.3 Conduct prescribed burning to improve wildlife habitat.

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.1 Control invasive insect infestations by implementing BMP strategies through biological, chemical and/or mechanical means that will depress, or when appropriate, eradicate populations in a manner that avoids excessive harm to non-target species using BMPs to control infestations and limit their spread based on an inventory of invasive insect distribution and response to outbreaks.

2.8.0.2 Develop, implement, monitor and evaluate pest control/management strategies to reduce the impacts of over-abundant wildlife species (native and/or native, invasive species) on native vegetation and the degradation of habitats supporting SGCN. Over-abundant wildlife species include but are not limited to mute swans, Canada geese, beaver and white-tailed deer.

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.5 Implement biologically safe and appropriate control/management strategies, and where appropriate, eradication strategies to reduce the impacts and/or limit the distribution of invasive and/or non-native plant species within or near aquatic systems using methods that will provide the most protection to the aquatic and riparian ecological system, and minimize disturbance to the soil and wildlife. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.8.0.6 Implement long-term management of invasive and/or non-native plants to help maintain functioning ecological systems and biological diversity, and to enhance travel corridors. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.2 Improve the availability of prey/food resources through terrestrial and aquatic plantings and habitat restoration for SGCN populations, in particular for those populations thought to be limited due wholly or in part to a lack of (or contaminated) food resources, and for migratory species (birds, bats, invertebrates).

2.10.0.3 Restore and/or enhance habitats to benefit urban-associated SGCN.

2.10.0.4 Restore and/or enhance suitable travel corridors connecting conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.8 Protect significant natural and/or unique communities by implementing best management practices when conducting habitat restoration strategies.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.10 Minimize the loss of important habitats (e.g., coastal scrub-shrub and grassy habitats, high and low marsh habitats, etc.) that provide nesting, migrating, and wintering areas for SGCN birds and other coastal and marsh-dependent species through habitat restoration efforts.

2.10.0.11 Restore and/or enhance critical migratory terrestrial and aquatic habitats (e.g., beach, grasslands, forest, scrub-shrub, etc.) for songbirds, raptors, shorebirds, waterfowl, bats and invertebrates through habitat restoration efforts and expand habitat restoration to adjacent private lands to increase the effective size of the habitat.

2.10.0.12 Create and/or maintain scrub-shrub habitats through revegetation efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.15 Restore and/or enhance terrestrial and aquatic habitats proximate to but not adjacent to roads and other transportation corridors for terrestrial-bound SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.10.0.21 Restore and/or enhance understory habitats that suppress invasive species and provide critical resources and enhance sheltering, foraging, and nesting cover for wildlife.

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.11.0.3 Create suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats through vegetation management.

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through vegetation management.

2.11.0.6 Reclaim degraded rare species habitats by conducting vegetation management needed to restore habitat value for the documented/target SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.23 Implement appropriate habitat management actions in areas where natural disturbances, such as wildfire, have been precluded.

2.11.0.24 Conduct vegetation management adjacent to aquatic habitats following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.25 Conduct vegetation management along access roads following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.26 Conduct vegetation management along roadsides and medians, avoiding peak activity periods for wildlife, that enhances wildlife dispersal naturally and safely across roads and similar barriers to/between terrestrial and/or aquatic habitats.

2.11.0.27 Conduct vegetation management for target shrub- or young forest-dependent SGCN following BMPs to minimize the risk of the establishment of invasive and non-native plants.

2.11.0.28 Conduct vegetation management in agricultural areas following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.29 Conduct vegetation management on transportation and service corridors (i.e., rights-of-way) following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.30 Identify and prioritize areas where various management tools (such as increasing salinity through the management of water levels or chemical applications) may be effective in reducing phragmites within and restoring marsh habitat.

2.11.0.31 In areas where vegetative communities are shifting due to fire suppression and controlled burns are not feasible, manage vegetation to improve wildlife habitat.

2.11.0.32 Increase structural habitat diversity around and when feasible, within agricultural landscapes by managing vegetation for a variety of species, in particular, those farms that have removed scrub-shrub habitat and/or fragmented forests, and by implementing ecologically best practices (e.g., no-till farming, maintaining hedgerows, buffer set-asides, etc.).

2.11.0.33 Increase structural habitat diversity by implementing long-term vegetation management to minimize the potential for the establishment of invasive and/or non-native plants that may outcompete native vegetation.

2.11.0.34 Increase structural habitat diversity by managing residential, commercial and recreational areas' landscapes for a variety of species. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.

2.11.0.38 Increase structural habitat diversity in and around horse/livestock farms by managing vegetation for a variety of species, in particular, in and around farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

2.11.0.39 Increase structural habitat diversity in and around solar farms by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.40 Increase structural habitat diversity surrounding areas used for energy, mining, and transportation and service corridors by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides, and avoid managing habitat during the breeding seasons for ground-nesting birds, reptiles, amphibians and small mammals.

2.11.0.41 Increase structural habitat diversity through the implementation of a variety of vegetation management practices such a prescribed burns (either increasing or decreasing their frequency depending on the site and objective), plantings, etc. that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.42 Increase structural habitat diversity within wind farms for terrestrial bound and low-flying species and around wind farms for other wildlife by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.43 Manage forests to increase variation in age structure and composition using BMPs that promote and maintain functioning ecological forest-based systems and biological diversity.

2.11.0.45 Regularly and/or rotationally create young forest habitat in targeted areas to maintain and regenerate a mosaic of upland forest habitats that will benefit shrub- and young forest-dependent species.

2.14 Wildlife disease management

2.14.0 Wildlife disease strategy development and investigation

2.14.0.1 Investigate diseases/pathogens impacting SGCN and/or their habitats.

2.14.0.2 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

2.14.0.3 Protect SGCN from exotic pathogen introduction or incident through implementation of a "rapid response plan"; DFW to give priority attention to these species in planning and/or implementing a response.

2.14.0.4 Conduct long-term monitoring of diseases in vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts.

2.14.0.5 Assess the impacts of diseases on the life cycles of wildlife.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.14 Identify areas with invasive, aquatic plants and animals and collect a detailed baseline assessment of the species' status and distribution. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort. Researchers and contractors performing Forest Stewardship Inventories and/or Plans on state lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.0.0.15 Conduct long-term monitoring of areas identified as having invasive, aquatic plants and animals to track the species' status/progress over time with or without the implementation of management strategies. Areas without management strategies should be assessed and prioritized for management/control. Areas where management strategies are being implemented should include an assessment of the management effort and identify/recommend and implement necessary changes to improve its success. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort.

3.0.0.26 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species including objectives and guidance pertaining to and the condition/status of critical and supporting habitats.

3.0.0.27 Evaluate the effectiveness of strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals through research and monitoring. Develop and provide NJ DEP and other appropriate governing agencies/commissions a summary of findings and recommendations to improve such efforts.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.7 Track (via a database that includes a GIS component) and research problematic species and diseases to determine their distribution, impacts on SGCN wildlife/wildlife communities, and develop potential control measures.

3.2.0.8 Implement and conduct long-term monitoring of control measures aimed at minimizing the impacts of problematic species and/or diseases to evaluate the effectiveness of such efforts and to identify and incorporate additional strategies as appropriate.

3.2.0.18 Conduct baseline surveys/inventories to better understand the distribution of fish and invertebrate (including freshwater mussels) populations.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.2 Age, size and sex structure

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.3 Baseline inventory

3.2.3.9 Investigate hazardous environmental issues that may impact grassland invertebrates.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.6 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) that could, through revegetation and/or enhancement efforts, become suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN.

3.3.1.7 Map and prioritize existing and potential areas for early succession forest management. Share the results with state, county and municipal planners.

3.3.1.8 Assess the availability and suitability of forest habitats for SGCN species (particularly reptiles and amphibians, birds, pollinators, and tiger beetles) in southern forests since Superstorm Sandy.

3.3.1.10 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and document fish SGCN habitats by plotting their distributions in GIS and submitting the data to the State for integration into the DEP's Biotics database.

3.3.1.16 Gather "best information" for spatial modeling and update/create a current model/depiction of anticipated habitat shifts from sea-level rise, flooding, etc.

3.3.1.17 Identify and map undeveloped roads and trails in all conserved forests, and create a database of locations. Integrate information regarding potentially sensitive areas.

3.3.1.18 Conduct an assessment using available data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels.

3.3.1.19 Identify and codify legal ORV access areas on state (and if appropriate, other conserved) lands. Provide GIS mapping to the landowner for potential use in directing such recreational activities.

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.2 Monitoring

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.8 Evaluate the effectiveness of current prescribed burning practices on Pinelands dependent species.

3.3.2.10 Evaluate the efficacy and success of different management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.3.2.11 Evaluate and compare the effectiveness of delayed mowing of warm season grass fields versus cool season hay fields to benefit grassland-dependent species.

3.3.2.12 Evaluate and compare the effectiveness of different management techniques (e.g., prescribed burning, mowing, brush-hogging, etc.) for maintaining suitable habitat for grassland-dependent species and species dependent upon early successional habitats.

3.3.2.13 Evaluate the effectiveness of management strategies (e.g., timing restrictions for mowing, cooperative agreements with utility companies for maintenance of rights-of-ways) that maintain and enhance large existing areas of grassland in perpetuity. Focus on habitat patches that can be managed to enhance the total size of suitable grassland habitat and create interspersed early-successional habitat.

3.3.2.15 Investigate the effectiveness of management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.3.2.20 Once a system is developed for reporting and qualifying new locations of invasive species, develop, implement and monitor/evaluate invasive species removal strategies at identified locations. Priority should be given to those areas critical to SGCN and/or contain unique and/or rare plant communities supporting SGCN and/or other fish/wildlife species.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.3 Develop/improve management techniques that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.9 Develop strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.3.16 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.3.19 Work with foresters to develop prescribed burning practices for Pinelands dependent species that increase or maintain habitat quality for these species in the Pinelands.

3.5.3.21 Develop management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.22 Identify (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) and modify management strategies (e.g., timing restrictions for mowing, cooperative agreements with utility companies for maintenance of rights-of-ways), based on research, that maintain and enhance large existing areas of grassland in perpetuity.

3.5.3.24 Based on research, modify management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.3.29 Explore the use of alternative vegetation (i.e., commodity crops) to address agriculture concerns.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.5 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

3.5.4.6 Investigate the feasibility of mitigating for the impacts of contaminants to vulnerable wildlife, particularly SGCN. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.5.4.14 Develop and implement agreements, and update existing agreements, with government agencies regarding the protection of critical SGCN habitats (e.g., significant breeding populations of beach nesting birds, colonial waterbird nesting areas, bat colonies, etc.).

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.18 Investigate the effectiveness of survey techniques through selected “ground truthing” and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

3.5.4.21 Develop BMPs to address problematic species and diseases of unknown origin.

4 Education

4.1 Educator/Instructor training

4.1.0 Public education

4.1.0.1 Provide educational resources and training programs to private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

5 Facilities and Areas

5.15 Wildlife Management Areas

5.15.6 Roads

5.15.6.1 Clearly post areas/roads where vehicle access is permitted.

5.15.6.2 Clearly post areas/trails where vehicle access is not permitted.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.7 Secure and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.8 Secure and protect scrub-shrub habitats for SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.8 Promote the protection of scrub-shrub habitats for SGCN through conservation area designations.

6.4 Private lands agreements

6.4.0 Private land agreement strategies

6.4.0.1 Enter into private lands agreements to expand control burns on private lands, in particular those adjacent to conserved lands to improve SGCN habitats.

7 Law Enforcement

7.1 Law enforcement

7.1.3 Sub-national Level

7.1.3.2 Increase the number of law enforcement officers tending to wildlife issues to a reasonable number to sufficiently cover the State and marine waters.

7.1.4 Scale Unspecified

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.19 Implement policies that protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

7.1.4.26 Educate law enforcement personnel that there may be unauthorized research projects taking place and to encourage them to investigate any activities that appear to be harmful to wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.2 Develop a team of personnel from government entities, conservation organizations and other stakeholders engaged in oil/gas spill response for marine and freshwater habitats to develop a feasible plan for oil spill response and/or to amend NJ's current oil spill response plan that clearly outlines each organizations responsibilities and an assessment and location list of available equipment for boom deployment during oil spills.

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.1.0.4 Engage government agencies, conservation partners and other stakeholders in constructive dialogues encouraging them to influence policy change and the creation of incentives through a habitat bill and/or municipal ordinances for backyard habitat.

8.1.0.15 Engage government agencies, conservation partners and other stakeholders in discussions encouraging and supporting the creation of laws and policies requiring vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

8.1.0.16 Engage local governments in discussions regarding the importance of them adopting/passing ordinances which require assessing and addressing secondary impacts (i.e., ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

8.1.0.17 Engage municipalities in constructive dialogue to identify and minimize destruction of areas prioritized for early succession forest management.

8.1.0.18 Engage NJDOT, NJ Transit Authority and other road management entities, wildlife conservation organizations/agencies (e.g., Division of Fish and Wildlife, New Jersey Conservation Foundation, Conserve Wildlife Foundation of NJ), and communities and citizens in discussions regarding the importance of and methods to enhance habitat connectivity, and work together to develop feasible strategies for ensuring that wildlife can disperse naturally and safely across roads and similar barriers to terrestrial and/or aquatic habitats.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.20 Organize a small focal group of government and non-government agencies/organizations responsible for decisions regarding beach/dune management to share and coordinate their goals so that comprehensive planning can attempt to meet all needs.

8.1.0.21 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation human-subsidized and/or overabundant, native species cause to local nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.22 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation invasive species cause to native nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.26 Coordinate across federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to woodland landowners to adopt or endorse consistent best management practices concerning controlled burns to maintain and/or improve forested habitat for wildlife.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.34 Work with the NJ Education Association and Department of Education to design curriculum and outdoor experimental learning opportunities, and provide training to teachers on implementation of these activities.

8.1.0.37 Enlist landowners and NJ citizens in the protection of and survey efforts for SGCN, in particular rare species, by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management and wildlife-related volunteer programs.

8.1.0.38 Engage partners, stakeholders and land managers in constructive dialogue promoting forest stewardship for SGCN that use core forests and forested corridors.

8.1.0.40 Encourage researchers, land managers, naturalists and enthusiasts to follow proper procedures for the coordination and/or permitting of research/management activities involving wildlife and sensitive habitats, and discourage activities that alter vegetation or wetlands, or cause harm or disturbance to wildlife.

8.1.0.42 Engage citizens, wildlife observers and photographers through discussions and distributable information regarding the importance of and encouraging implementing responsible and ethical behavior when observing wildlife by developing an alliance of wildlife photographers and widely circulating recommendations on how to reduce impact.

8.1.0.44 Engage conservation partners, stakeholders, government agencies and other land stewards in constructive dialogues encouraging their inclusion of controlled burns in forest and other stewardship plans.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.1.0.48 Form cooperative partnerships with transportation and shipment agencies and companies to facilitate habitat creation and enhancement away from and outside of project areas and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.2 Recruitment and retention activities

8.2.3 For wildlife watching

8.2.3.1 Develop and implement nature-focused tourism opportunities including wildlife viewing sites, interpretive signage highlighting unique ecosystems/habitats, and wildlife-related recreational opportunities that do not negatively impact SGCN or their habitats.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.7 Develop and provide (or otherwise make publicly available) educational programs and/or materials that describe the negative impacts of off-road vehicles and watercraft use in and adjacent to critical SGCN habitats, and the importance of confining such activities to more appropriate locations and/or seasons.

8.3.0.8 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate recreationists and encourage landowners to eliminate garbage in the vicinity of suitable wildlife habitat, in particular SGCN habitat. Information should include the detrimental impacts garbage may have on various wildlife species.

8.3.0.9 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners and land managers to include only native plants in landscaping and restoration projects. Provide information to assist them in detecting problematic establishment of invasive, non-indigenous plants.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.11 Develop and provide (or otherwise make publicly available) educational programs and/or materials to the public, wildlife-related professionals, foresters, etc., that describe the value of species that are often feared (e.g., snakes, bats, spiders, Allegheny woodrat) and/or deemed a "nuisance" (e.g., squirrel, deer, snapping turtle), and therefore, persecuted by people. Include information on tolerance, proper identification, eviction from human dwellings, how to minimize the animal's presence on the property, and/or how to live in harmony with the animal.

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.24 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

8.3.0.25 Develop educational outreach programs for landowners, nurseries and the general public regarding the negative impacts of invasive and non-native plants on our natural communities.

8.3.0.26 Develop educational outreach programs for private and public landowners and land managers regarding the importance of and how to manage core forests and forested corridors in a way that will be beneficial for SGCN, particularly endangered, threatened and special concern species.

8.3.0.27 Develop educational outreach programs for public and private landowners and land managers regarding the importance of structural habitat diversity, methods to increase diversity, and/or incentive programs available to increase habitat diversity.

8.3.0.28 Develop educational outreach programs for public and private landowners and land managers regarding the importance of managing grasslands for grassland-dependent species, methods of management, and/or incentive programs available.

8.3.0.30 Develop educational outreach programs for private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.5 Develop a plan that directs the creation or expansion of energy or utility rights-of-way in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.6 Develop a plan that directs the creation or expansion of roads and railroads or the re-establishment of abandoned railroads within and adjacent to critical forested habitats in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.8 Develop a plan that focuses on strategies for oil pipelines to avoid sensitive habitats that would be highly impacted by oil spills.

9.1.0.9 Develop a plan that focuses on strategies to minimize the creation of renewable energy farms (e.g., solar, wind) and related infrastructures within and their impacts on forested habitats and the wildlife community.

9.1.0.10 Develop a plan that focuses on strategies to minimize the impacts of mining on critical forested habitats.

9.1.0.11 Develop a plan that focuses on strategies to minimize the impacts of power plants on critical forested habitats and the wildlife community.

9.1.0.13 Develop a plan to minimize agriculture that would result in groundwater withdrawal in critical forested areas.

9.1.0.15 Develop a plan to minimize fragmentation of terrestrial and aquatic habitats by roads.

9.1.0.16 Develop a plan to minimize new lawnscapes and preserve natural vegetation within and adjacent to critical forest areas.

9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

9.1.0.21 Develop a plan to minimize the use of any-sized dam in critical forested areas.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.2 Organizational strategic and CMS planning

9.2.1 Organizational strategic and operational planning

9.2.1.1 Identify and codify legal ORV access areas on state lands.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.5 Develop response plans to address disease outbreaks within wildlife populations, in particular SGCN.

9.3.1.7 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.10 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.15 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.1.16 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3 Habitat management planning

9.3.3.5 Develop a management plan using forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

9.3.3.7 Develop a management plan to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

9.3.3.8 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.3.13 Develop a management plan that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas and prevents or ameliorates near-term impacts of climate change throughout the State, but in particular within the coastal and Delaware Bay areas.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.16 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.3.17 Develop a management plan for prescribed burning that will benefit Pinelands dependent species and increase or maintain habitat quality for these species in the Pinelands.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.21 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.3.26 Develop a management plan for parcels of suitable size to be managed for native herbaceous plant species that support breeding grassland dependent species.

9.3.3.28 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.3.29 Develop habitat management plans aimed at reducing or eliminating negative impacts of ORVs.

9.3.3.32 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3.34 Include controlled burn prescriptions in forest and stewardship plans to improve wildlife habitat.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.12 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed solar farm projects to reduce habitat fragmentation and minimize impacts on wildlife.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.2 Provide technical support to public and private landowners and land managers for controlling invasive, native and non-native plant species in order to increase structural habitat diversity.

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.7 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on the importance of maintaining habitat connectivity, minimizing fragmentation, and the use of CHANJ products to help them target areas for such planning.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.11 Provide educational resources, training programs, and on-the-ground guidance to private and public landowners and land managers on the benefits of and for creating young forest and early succession habitat for SGCN.

11.2.0.12 Provide educational resources and technical support to public landowners and land managers for managing grasslands for grassland-dependent species.

11.2.0.15 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and landowners about the importance of retaining and in an effort to protect, create, enhance and/or restore vegetation along aquatic habitats.

11.2.0.17 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of vernal pools and the protection, enhancement and/or restoration of biologically appropriate buffers.

11.2.0.22 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

11.2.0.23 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to SGCN habitats to promote the protection and/or enhancement of those adjacent habitats to increase the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and that connect conserved SGCN habitats.

11.2.0.24 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers on how to manage vegetated roadside areas (e.g., mowing, brush-hogging, etc.) on a schedule that avoids peak activity periods for wildlife and therefore, minimizes harm.

11.2.0.25 Provide educational resources, training programs, and on-the-ground guidance to resource managers regarding the assessment of and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) related to residential and commercial development.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.1 Engage partners and stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.3 Provide educational resources, training programs, and on-the-ground guidance to DOD to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop and implement forest management and other practices that minimize disturbances to SGCN (i.e., beyond their federal requirements).

11.2.1.5 Provide educational resources, training programs, and on-the-ground guidance to municipalities, state and federal agency resource managers on tasks such as writing and integrating Beach Management Plans into other management documents.

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

11.2.2 With private landowners

11.2.2.1 Provide technical support to farming operations and woodland landowners on ways to decrease clean farming (edge-to-edge) practices and create ecotones to benefit bobwhite and other species dependent on early successional habitat.

100 Law and Policy

100. Legislation

100.1.2 National Level

100.1.2.1 Create legislation to establish markets for warm-season grasses to increase the permanency of this crop on the landscape.

100.1.3 Sub-national Level

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.4 County and Local

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.3 Expand the acreages and enhance the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN through local ordinances.

100.1.4.14 Adopt/pass local ordinances which require assessing and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100.1.5.5 Develop legislation to provide financial support for the New Jersey Invasive Species Strike Team.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.5 Develop policies that will promote improved and secure habitat connections between conserved SGCN habitats.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.12 Develop policies that promote the preservation and protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.23 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.31 Create or expand tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMPs.

100.3.0.32 Coordinate regulations across agencies to maximize availability of and enrollment in existing Forestry Stewardship Programs (e.g., "Woodland Stewards", Farm Bill, partners, etc.) to maintain and/or improve forest habitat.

100.3.0.38 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.3.0.39 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.3.0.40 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.45 Increase the controlled burn season to focus on restoring vegetative communities.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.48 Propose new State law or regulation mandating that a State-level "development impact fee" be assessed on all new development approved by municipalities (via the Municipal Land Use Law processes), and dedicate such monies to the development and implementation of regional Habitat Conservation Plans (or existing plans/programs serving the same regional function).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.53 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded rights-of-way corridors associated with energy transport/transmission.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.65 Develop regulations that when implemented will protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100.3.0.73 Develop regulations that would exempt the conversion of lawns to native vegetation (beneficial to wildlife) from local lawn ordinances.

100.3.2 State Land Acquisition Programs

100.3.2.1 Increase opportunities for habitat restoration by making any necessary policy changes to state, federal and local land acquisition programs (e.g., Green Acres, Blue Acres, etc.) to allow for acquisition within abandoned or failing bay shore communities, including mechanisms to relocate displaced people and infrastructure.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.2 Create a policy that requires the NJ DEP to incorporate scientific information regarding climate change and sea level rise (e.g., predictions, habitat management/acquisition efforts to enhance resilience to inundation) on their websites and to work with other government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

100.4.0.3 Develop policies for mandatory buffer strips on preserved farmlands and state-owned agricultural lands.

100.4.0.8 Develop a white paper addressing the impacts that existing, new or expanded rights-of-way have upon wildlife, wildlife habitats and habitat connectivity.

100.4.0.10 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.4.0.11 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.4.0.12 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.4.0.13 Develop policies for different circumstances (e.g., roadsides and medians, riparian, aquatic and terrestrial habitats) that outline appropriate habitat/vegetation management strategies and schedules to minimize risks to and benefit wildlife.

100.4.0.14 Develop policies to facilitate agreements between eligible entities to manage appropriate conserved lands for grassland-dependent species, and to have access to/obtain restoration funds.

100.4.0.16 Develop policies to implement habitat management strategies that will increase the structural diversity surrounding areas used for energy, mining, and transportation and service corridors which include but are not limited to the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-

100.4.0.17 Develop policies to implement habitat management strategies, including prescribed burns, that will increase the structural diversity on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies to control and reduce the impacts of invasive, non-native species in order to increase structural habitat diversity.

100.4.0.18 Develop policies to minimize the extent of infrastructure associated with energy and service corridors or areas (e.g., wind and solar farms, pipelines, utility lines) and that require the implementation of habitat management strategies that will increase the structural diversity in the area including (e.g., the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides).

100.4.0.19 Develop regulations that will minimize the creation of new barriers, remove or replace current barriers with appropriately-sized systems to accommodate wildlife dispersal, and to minimize road widening and traffic volume increases within critical wildlife habitat areas.

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.24 Develop policies to provide financial support for the New Jersey Invasive Species Strike Team.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

New Jersey Pine Barrens Tiger Beetle

Focal species that comprise this Conservation Target:

New Jersey Pine Barrens Tiger Beetle

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:
- 1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.1.1.2 Loss, alteration and/or degradation of habitat.
- 1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:
- 1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.2.1.2 Loss, alteration and/or degradation of habitat.
- 1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:
- 1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.3.1.2 Loss, alteration and/or degradation of habitat.
- 1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture (Avg. Score: 1.00)

NJ Specific Threats:
- 2.1.1.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.2 Wood and Pulp Plantations

2.2.1 Small Holder (Avg. Score: 1.00)

NJ Specific Threats:
- 2.2.1.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.2.2 Agro-industry Plantations (Avg. Score: 1.00)

NJ Specific Threats: 2.2.2.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

3 Energy Production and Mining

3.2 Mining and Quarrying

3.2.2 Surface Mining - Rock Quarry (and sand quarries) (Avg. Score: 1.00)

NJ Specific Threats: 3.2.2.1 Fragments terrestrial and aquatic habitats.

3.2.2.2 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

3.3 Renewable Energy

3.3.2 Solar Power (Avg. Score: 1.00)

NJ Specific Threats: 3.3.2.2 Loss, alteration and/or degradation of habitat.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads (Avg. Score: 1.00)

NJ Specific Threats: 4.2.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species, inhibiting dispersal of non-volant animals, reducing gene flow, and creating barriers to fish when service line-associated roads cross streams (e.g., bridges, culverts, fords, etc.).

4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

4.2.2 Management of rights-of-way or communication tower facilities and/or their associated access roads (Avg. Score: 1.00)

NJ Specific Threats: 4.2.2.1 Improper or poorly scheduled vegetation management can cause direct mortality to and may reduce productivity of wildlife.

5 Biological Resource Use

5.1 Hunting and Collecting Terrestrial Animals

5.1.1 Intentional Use (Avg. Score: 1.00)

NJ Specific Threats: 5.1.1.1 Illegal collection of wildlife can have detrimental impacts on populations.

5.3 Logging and Wood Harvesting

5.3.1 Intentional Use (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.1.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.1.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.1.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.1.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.1.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.1.6 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices in Atlantic White Cedar stands may destroy a unique wildlife wetland habitat that is difficult, and takes time, to restore.

5.3.2 Intentional Use (large scale) (Avg. Score: 1.00)

NJ Specific Threats:

5.3.2.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.2.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.2.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.2.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.2.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.2.6 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices in Atlantic White Cedar stands may destroy a unique wildlife wetland habitat that is difficult, and takes time, to restore.

5.3.3 Unintentional effects (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats:

5.3.3.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4 Unintentional effects (large scale) (Avg. Score: 1.00)

NJ Specific Threats:

5.3.4.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4.5 Lack of appropriate, sustainable forest management can lead to a decrease in forest habitat diversity, degraded habitat for many forest species, the loss of habitat for early-successional species, and/or the loss of unique habitats for species that need canopy breaks and multi-aged tree composition to fulfill various life history requirements.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized) (Avg. Score: 3.00)

NJ Specific Threats:

6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.

6.1.1.3 Increased risk of harassment that results in a change in wildlife behavior and/or direct mortality from vehicle strikes.

6.1.1.6 Off-road vehicles can be a mechanism of transference of wildlife diseases and invasive plant species if gear and apparel are not properly sanitized between sites.

7 Natural Systems Modifications

7.1 Fire and Fire Suppression

7.1.1 Increase in Fire Frequency/Intensity (Avg. Score: 3.00)

NJ Specific Threats:

7.1.1.1 Increase in frequency and intensity of wild fires as a result of droughts and heat waves drying out vegetation and litter.

7.1.1.2 Increase in frequency of wild fires as a result of illegal activities.

7.1.1.3 Unnatural fire regimes occurring as a result of military exercises.

7.1.1.4 Lack of diversity in age structure and composition of vegetation due to expansive, frequent fires.

7.1.2 Suppression of Fire Frequency/Intensity (Avg. Score: 3.00)

NJ Specific Threats:

7.1.2.1 Shift in vegetative communities as a result of suppression of natural fires.

7.1.2.2 Lack of diversity in age structure and composition of vegetation due to the suppression of fire.

7.3 Other Ecosystem Modifications

7.3.2 Inappropriate timing of mowing (Avg. Score: 1.00)

NJ Specific Threats:

7.3.2.1 Increased risk of direct mortality and/or reduced productivity of wildlife, as well as reduced use by migrating species.

7.3.5 Poor habitat management (Avg. Score: 3.00)

NJ Specific Threats:

7.3.5.1 Improper or poorly scheduled maintenance of man-made corridors (e.g., roadsides and medians) can cause direct mortality to and may reduce productivity of wildlife.

7.3.5.2 Shifting from natural vegetation to lawns can cause increased temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

7.3.5.3 Vegetation clearing removes terrestrial and riparian corridors for animal movement, shelter, and resting areas.

7.3.5.4 Vegetation clearing or inappropriate alteration adjacent to aquatic habitats threatens aquatic species by degrading habitat and water quality (altering temperature and dissolved oxygen, increasing siltation and desiccation, etc.).

7.3.5.5 Habitat management that alters or removes vegetation without implementing long-term management increases the risk of invasive and exotic plants establishing themselves, outcompeting native vegetation.

7.3.5.6 Habitat management, including that which occurs on public and private lands, that does not consider timing and species' behaviors can result in the direct mortality and/or alteration or loss of habitat.

7.3.5.12 Lack of diversity in age structure and composition of vegetation due to lack of natural disturbances and/or vegetation management.

7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats:

8.1.1.1 Displace or outcompete native species for resources.

8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.

8.1.1.3 Invasive, non-native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

8.1.1.4 Invasive, non-native animals increase the risk of predation on native animals and/or herbivory on native vegetation.

8.1.1.5 Invasive, non-native animals and plants increase the risk of introduction and transference of diseases

8.1.1.6 Invasive, non-native plants may create physical barriers for some species.

8.1.4 Invasive non-native terrestrial/wetland animals (Avg. Score: 1.00)

NJ Specific Threats: 8.1.4.1 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.3 Agricultural and Forestry Effluents

9.3.3 Herbicides and Pesticides (Avg. Score: 2.00)

NJ Specific Threats: 9.3.3.1 Pesticides degrade terrestrial and aquatic habitats, especially streams, ponds and wetlands. Aquatic wildlife are particularly sensitive to these contaminants, which can cause developmental and behavioral abnormalities and reproductive failure. Some contaminants may bioaccumulate in predatory fish and birds and disrupt reproduction.

9.3.3.3 Use of pesticides can directly harm non-target species through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture (Avg. Score: 2.00)

NJ Specific Threats: 9.3.5.1 Use of pesticides, insecticides, and/or herbicides can directly harm non-target species, such as amphibians and beneficial invertebrates through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5.4 Improper use of current insecticides, such as those containing esfenvalerate, prallethrin, or piperonyl butoxide, or past use of pesticides containing chlordane still present in the soils, are toxic to various wildlife species, and can cause injury, mortality, or other effects that impair population viability.

9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.5 Air-Bourne Pollutants

9.5.6 Herbicides and Pesticides (Avg. Score: 2.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 2.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 3.00)

NJ Specific Threats: 12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.2 Lack of up-to-date existing information (Avg. Score: 3.00)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.3 Need to answer research question (Avg. Score: 3.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.4 Need to develop new technique (Avg. Score: 3.00)

NJ Specific Threats: 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 1.00)

NJ Specific Threats: 12.3.0.1 Regulatory habitat protections within state land use regulations are spatially limited to specific geographic areas (e.g., Pinelands, Coastal Area) or geographic features (e.g., wetlands, streams) and so fail to protect critical habitats that exist outside of these regulated areas.

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.9 Prescribed burns implemented by the NJ Forest Fire Service are constrained by State air quality regulations to a timeframe where seasonal weather conditions are less than ideal for effective burning. As a result, the Forest Fire Service is limited in the number of overall prescribed burns it can implement to restore habitat for wildlife.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 1.00)

NJ Specific Threats: 12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 3.00)

NJ Specific Threats: 14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 3.00)

NJ Specific Threats: 14.2.1.1 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various forest management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 1.00)

NJ Specific Threats: 15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.5 Secure and promote the protection/restoration of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through incentive programs.

1.2.1.6 Secure and promote the protection/restoration of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.9 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing Forestry Stewardship Programs.

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.12 Create incentives (non-monetary and/or monetary) for land developers to redevelop abandoned areas (e.g., shopping centers, office complexes) to minimize the loss of natural habitats and reduce the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.14 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of herbicides and pesticides, and implementing more ecologically safe strategies when using such products.

1.2.1.15 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of rodenticides, and implementing more ecologically safe strategies when using such products.

1.2.1.16 Create incentives (non-monetary and/or monetary) within State regulations (mitigations requirements or credit, BMP satisfaction, etc.) to promote the use of retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.17 Develop a public-relations oriented certification program for private retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.18 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and land managers to control and reduce the impacts of invasive, native and non-native species in order to increase structural habitat diversity.

1.2.1.19 Create incentives for federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to farmers, woodland landowners, and private landowners to adopt and/or endorse consistent BMPs concerning controlled burns to maintain and/or improve wildlife habitat.

1.2.1.20 Coordinate across government agencies and non-government organizations to create or expand upon tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMP's.

1.2.1.21 Create and/or support market-based programs that subsidize or create branding for products derived sustainably from managed wildlife habitats.

1.2.1.22 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to horse/livestock farm owners and managers to increase structural habitat diversity in and around the farms by managing vegetation for a variety of species, in particular, farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

1.2.1.23 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to provide cost shares and/or plan approvals for management based on management approaches and prescriptions.

1.2.1.24 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners, with habitat of suitable patch size to support breeding grassland-dependent species, to alter the timing of vegetation management to benefit grassland and pollinator species.

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

1.2.1.28 Create incentives to implement dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

2 Direct Management of Natural Resources

2.3 Fire management

2.3.2 Fuel reduction

2.3.2.1 Prevent wildfires by reducing natural fuel (e.g., leaf litter).

2.3.3 Prescribed burning

2.3.3.1 Evaluate different management techniques of prescribed burns that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

2.3.3.2 Conduct prescribed burning in Northern New Jersey forests to maintain and regenerate a mosaic of upland forest habitats.

2.3.3.3 Conduct prescribed burning to improve wildlife habitat.

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.1 Control invasive insect infestations by implementing BMP strategies through biological, chemical and/or mechanical means that will depress, or when appropriate, eradicate populations in a manner that avoids excessive harm to non-target species using BMPs to control infestations and limit their spread based on an inventory of invasive insect distribution and response to outbreaks.

2.8.0.2 Develop, implement, monitor and evaluate pest control/management strategies to reduce the impacts of over-abundant wildlife species (native and/or native, invasive species) on native vegetation and the degradation of habitats supporting SGCN. Over-abundant wildlife species include but are not limited to mute swans, Canada geese, beaver and white-tailed deer.

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.5 Implement biologically safe and appropriate control/management strategies, and where appropriate, eradication strategies to reduce the impacts and/or limit the distribution of invasive and/or non-native plant species within or near aquatic systems using methods that will provide the most protection to the aquatic and riparian ecological system, and minimize disturbance to the soil and wildlife. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.8.0.6 Implement long-term management of invasive and/or non-native plants to help maintain functioning ecological systems and biological diversity, and to enhance travel corridors. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.2 Improve the availability of prey/food resources through terrestrial and aquatic plantings and habitat restoration for SGCN populations, in particular for those populations thought to be limited due wholly or in part to a lack of (or contaminated) food resources, and for migratory species (birds, bats, invertebrates).

2.10.0.3 Restore and/or enhance habitats to benefit urban-associated SGCN.

2.10.0.4 Restore and/or enhance suitable travel corridors connecting conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.8 Protect significant natural and/or unique communities by implementing best management practices when conducting habitat restoration strategies.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.10 Minimize the loss of important habitats (e.g., coastal scrub-shrub and grassy habitats, high and low marsh habitats, etc.) that provide nesting, migrating, and wintering areas for SGCN birds and other coastal and marsh-dependent species through habitat restoration efforts.

2.10.0.11 Restore and/or enhance critical migratory terrestrial and aquatic habitats (e.g., beach, grasslands, forest, scrub-shrub, etc.) for songbirds, raptors, shorebirds, waterfowl, bats and invertebrates through habitat restoration efforts and expand habitat restoration to adjacent private lands to increase the effective size of the habitat.

2.10.0.12 Create and/or maintain scrub-shrub habitats through revegetation efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.15 Restore and/or enhance terrestrial and aquatic habitats proximate to but not adjacent to roads and other transportation corridors for terrestrial-bound SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.10.0.21 Restore and/or enhance understory habitats that suppress invasive species and provide critical resources and enhance sheltering, foraging, and nesting cover for wildlife.

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.11.0.3 Create suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats through vegetation management.

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through vegetation management.

2.11.0.6 Reclaim degraded rare species habitats by conducting vegetation management needed to restore habitat value for the documented/target SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.23 Implement appropriate habitat management actions in areas where natural disturbances, such as wildfire, have been precluded.

2.11.0.24 Conduct vegetation management adjacent to aquatic habitats following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.25 Conduct vegetation management along access roads following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.26 Conduct vegetation management along roadsides and medians, avoiding peak activity periods for wildlife, that enhances wildlife dispersal naturally and safely across roads and similar barriers to/between terrestrial and/or aquatic habitats.

2.11.0.27 Conduct vegetation management for target shrub- or young forest-dependent SGCN following BMPs to minimize the risk of the establishment of invasive and non-native plants.

2.11.0.28 Conduct vegetation management in agricultural areas following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.29 Conduct vegetation management on transportation and service corridors (i.e., rights-of-way) following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.30 Identify and prioritize areas where various management tools (such as increasing salinity through the management of water levels or chemical applications) may be effective in reducing phragmites within and restoring marsh habitat.

2.11.0.31 In areas where vegetative communities are shifting due to fire suppression and controlled burns are not feasible, manage vegetation to improve wildlife habitat.

2.11.0.32 Increase structural habitat diversity around and when feasible, within agricultural landscapes by managing vegetation for a variety of species, in particular, those farms that have removed scrub-shrub habitat and/or fragmented forests, and by implementing ecologically best practices (e.g., no-till farming, maintaining hedgerows, buffer set-asides, etc.).

2.11.0.33 Increase structural habitat diversity by implementing long-term vegetation management to minimize the potential for the establishment of invasive and/or non-native plants that may outcompete native vegetation.

2.11.0.34 Increase structural habitat diversity by managing residential, commercial and recreational areas' landscapes for a variety of species. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.

2.11.0.38 Increase structural habitat diversity in and around horse/livestock farms by managing vegetation for a variety of species, in particular, in and around farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

2.11.0.39 Increase structural habitat diversity in and around solar farms by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.40 Increase structural habitat diversity surrounding areas used for energy, mining, and transportation and service corridors by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides, and avoid managing habitat during the breeding seasons for ground-nesting birds, reptiles, amphibians and small mammals.

2.11.0.41 Increase structural habitat diversity through the implementation of a variety of vegetation management practices such a prescribed burns (either increasing or decreasing their frequency depending on the site and objective), plantings, etc. that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.42 Increase structural habitat diversity within wind farms for terrestrial bound and low-flying species and around wind farms for other wildlife by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.43 Manage forests to increase variation in age structure and composition using BMPs that promote and maintain functioning ecological forest-based systems and biological diversity.

2.11.0.45 Regularly and/or rotationally create young forest habitat in targeted areas to maintain and regenerate a mosaic of upland forest habitats that will benefit shrub- and young forest-dependent species.

2.14 Wildlife disease management

2.14.0 Wildlife disease strategy development and investigation

2.14.0.1 Investigate diseases/pathogens impacting SGCN and/or their habitats.

2.14.0.2 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

2.14.0.3 Protect SGCN from exotic pathogen introduction or incident through implementation of a "rapid response plan"; DFW to give priority attention to these species in planning and/or implementing a response.

2.14.0.4 Conduct long-term monitoring of diseases in vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts.

2.14.0.5 Assess the impacts of diseases on the life cycles of wildlife.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.14 Identify areas with invasive, aquatic plants and animals and collect a detailed baseline assessment of the species' status and distribution. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort. Researchers and contractors performing Forest Stewardship Inventories and/or Plans on state lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.0.0.15 Conduct long-term monitoring of areas identified as having invasive, aquatic plants and animals to track the species' status/progress over time with or without the implementation of management strategies. Areas without management strategies should be assessed and prioritized for management/control. Areas where management strategies are being implemented should include an assessment of the management effort and identify/recommend and implement necessary changes to improve its success. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort.

3.0.0.26 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species including objectives and guidance pertaining to and the condition/status of critical and supporting habitats.

3.0.0.27 Evaluate the effectiveness of strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals through research and monitoring. Develop and provide NJ DEP and other appropriate governing agencies/commissions a summary of findings and recommendations to improve such efforts.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.7 Track (via a database that includes a GIS component) and research problematic species and diseases to determine their distribution, impacts on SGCN wildlife/wildlife communities, and develop potential control measures.

3.2.0.8 Implement and conduct long-term monitoring of control measures aimed at minimizing the impacts of problematic species and/or diseases to evaluate the effectiveness of such efforts and to identify and incorporate additional strategies as appropriate.

3.2.0.18 Conduct baseline surveys/inventories to better understand the distribution of fish and invertebrate (including freshwater mussels) populations.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.2 Age, size and sex structure

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.3 Baseline inventory

3.2.3.9 Investigate hazardous environmental issues that may impact grassland invertebrates.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.6 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) that could, through revegetation and/or enhancement efforts, become suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN.

3.3.1.7 Map and prioritize existing and potential areas for early succession forest management. Share the results with state, county and municipal planners.

3.3.1.8 Assess the availability and suitability of forest habitats for SGCN species (particularly reptiles and amphibians, birds, pollinators, and tiger beetles) in southern forests since Superstorm Sandy.

3.3.1.10 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and document fish SGCN habitats by plotting their distributions in GIS and submitting the data to the State for integration into the DEP's Biotics database.

3.3.1.16 Gather "best information" for spatial modeling and update/create a current model/depiction of anticipated habitat shifts from sea-level rise, flooding, etc.

3.3.1.17 Identify and map undeveloped roads and trails in all conserved forests, and create a database of locations. Integrate information regarding potentially sensitive areas.

3.3.1.18 Conduct an assessment using available data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels.

3.3.1.19 Identify and codify legal ORV access areas on state (and if appropriate, other conserved) lands. Provide GIS mapping to the landowner for potential use in directing such recreational activities.

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.2 Monitoring

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.8 Evaluate the effectiveness of current prescribed burning practices on Pinelands dependent species.

3.3.2.9 Investigate the effectiveness of various silviculture techniques for enhancing forests for forest-dependent SGCN.

3.3.2.10 Evaluate the efficacy and success of different management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.3.2.15 Investigate the effectiveness of management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.3.2.20 Once a system is developed for reporting and qualifying new locations of invasive species, develop, implement and monitor/evaluate invasive species removal strategies at identified locations. Priority should be given to those areas critical to SGCN and/or contain unique and/or rare plant communities supporting SGCN and/or other fish/wildlife species.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.3 Develop/improve management techniques that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.9 Develop strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.3.16 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.3.19 Work with foresters to develop prescribed burning practices for Pinelands dependent species that increase or maintain habitat quality for these species in the Pinelands.

3.5.3.21 Develop management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.24 Based on research, modify management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.5 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

3.5.4.6 Investigate the feasibility of mitigating for the impacts of contaminants to vulnerable wildlife, particularly SGCN. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.5.4.14 Develop and implement agreements, and update existing agreements, with government agencies regarding the protection of critical SGCN habitats (e.g., significant breeding populations of beach nesting birds, colonial waterbird nesting areas, bat colonies, etc.).

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.18 Investigate the effectiveness of survey techniques through selected “ground truthing” and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

3.5.4.21 Develop BMPs to address problematic species and diseases of unknown origin.

4 Education

4.1 Educator/Instructor training

4.1.0 Public education

4.1.0.1 Provide educational resources and training programs to private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

5 Facilities and Areas

5.15 Wildlife Management Areas

5.15.6 Roads

5.15.6.1 Clearly post areas/roads where vehicle access is permitted.

5.15.6.2 Clearly post areas/trails where vehicle access is not permitted.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.7 Secure and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.8 Secure and protect scrub-shrub habitats for SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.8 Promote the protection of scrub-shrub habitats for SGCN through conservation area designations.

6.4 Private lands agreements

6.4.0 Private land agreement strategies

6.4.0.1 Enter into private lands agreements to expand control burns on private lands, in particular those adjacent to conserved lands to improve SGCN habitats.

7 Law Enforcement

7.1 Law enforcement

7.1.3 Sub-national Level

7.1.3.2 Increase the number of law enforcement officers tending to wildlife issues to a reasonable number to sufficiently cover the State and marine waters.

7.1.4 Scale Unspecified

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.19 Implement policies that protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

7.1.4.26 Educate law enforcement personnel that there may be unauthorized research projects taking place and to encourage them to investigate any activities that appear to be harmful to wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.2 Develop a team of personnel from government entities, conservation organizations and other stakeholders engaged in oil/gas spill response for marine and freshwater habitats to develop a feasible plan for oil spill response and/or to amend NJ's current oil spill response plan that clearly outlines each organizations responsibilities and an assessment and location list of available equipment for boom deployment during oil spills.

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.1.0.4 Engage government agencies, conservation partners and other stakeholders in constructive dialogues encouraging them to influence policy change and the creation of incentives through a habitat bill and/or municipal ordinances for backyard habitat.

8.1.0.15 Engage government agencies, conservation partners and other stakeholders in discussions encouraging and supporting the creation of laws and policies requiring vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

8.1.0.16 Engage local governments in discussions regarding the importance of them adopting/passing ordinances which require assessing and addressing secondary impacts (i.e., ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

8.1.0.17 Engage municipalities in constructive dialogue to identify and minimize destruction of areas prioritized for early succession forest management.

8.1.0.18 Engage NJDOT, NJ Transit Authority and other road management entities, wildlife conservation organizations/agencies (e.g., Division of Fish and Wildlife, New Jersey Conservation Foundation, Conserve Wildlife Foundation of NJ), and communities and citizens in discussions regarding the importance of and methods to enhance habitat connectivity, and work together to develop feasible strategies for ensuring that wildlife can disperse naturally and safely across roads and similar barriers to terrestrial and/or aquatic habitats.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.20 Organize a small focal group of government and non-government agencies/organizations responsible for decisions regarding beach/dune management to share and coordinate their goals so that comprehensive planning can attempt to meet all needs.

8.1.0.21 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation human-subsidized and/or overabundant, native species cause to local nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.22 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation invasive species cause to native nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.26 Coordinate across federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to woodland landowners to adopt or endorse consistent best management practices concerning controlled burns to maintain and/or improve forested habitat for wildlife.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.34 Work with the NJ Education Association and Department of Education to design curriculum and outdoor experimental learning opportunities, and provide training to teachers on implementation of these activities.

8.1.0.37 Enlist landowners and NJ citizens in the protection of and survey efforts for SGCN, in particular rare species, by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management and wildlife-related volunteer programs.

8.1.0.38 Engage partners, stakeholders and land managers in constructive dialogue promoting forest stewardship for SGCN that use core forests and forested corridors.

8.1.0.40 Encourage researchers, land managers, naturalists and enthusiasts to follow proper procedures for the coordination and/or permitting of research/management activities involving wildlife and sensitive habitats, and discourage activities that alter vegetation or wetlands, or cause harm or disturbance to wildlife.

8.1.0.42 Engage citizens, wildlife observers and photographers through discussions and distributable information regarding the importance of and encouraging implementing responsible and ethical behavior when observing wildlife by developing an alliance of wildlife photographers and widely circulating recommendations on how to reduce impact.

8.1.0.44 Engage conservation partners, stakeholders, government agencies and other land stewards in constructive dialogues encouraging their inclusion of controlled burns in forest and other stewardship plans.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.1.0.48 Form cooperative partnerships with transportation and shipment agencies and companies to facilitate habitat creation and enhancement away from and outside of project areas and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.2 Recruitment and retention activities

8.2.3 For wildlife watching

8.2.3.1 Develop and implement nature-focused tourism opportunities including wildlife viewing sites, interpretive signage highlighting unique ecosystems/habitats, and wildlife-related recreational opportunities that do not negatively impact SGCN or their habitats.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.7 Develop and provide (or otherwise make publicly available) educational programs and/or materials that describe the negative impacts of off-road vehicles and watercraft use in and adjacent to critical SGCN habitats, and the importance of confining such activities to more appropriate locations and/or seasons.

8.3.0.8 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate recreationists and encourage landowners to eliminate garbage in the vicinity of suitable wildlife habitat, in particular SGCN habitat. Information should include the detrimental impacts garbage may have on various wildlife species.

8.3.0.9 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners and land managers to include only native plants in landscaping and restoration projects. Provide information to assist them in detecting problematic establishment of invasive, non-indigenous plants.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.11 Develop and provide (or otherwise make publicly available) educational programs and/or materials to the public, wildlife-related professionals, foresters, etc., that describe the value of species that are often feared (e.g., snakes, bats, spiders, Allegheny woodrat) and/or deemed a "nuisance" (e.g., squirrel, deer, snapping turtle), and therefore, persecuted by people. Include information on tolerance, proper identification, eviction from human dwellings, how to minimize the animal's presence on the property, and/or how to live in harmony with the animal.

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.24 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

8.3.0.25 Develop educational outreach programs for landowners, nurseries and the general public regarding the negative impacts of invasive and non-native plants on our natural communities.

8.3.0.26 Develop educational outreach programs for private and public landowners and land managers regarding the importance of and how to manage core forests and forested corridors in a way that will be beneficial for SGCN, particularly endangered, threatened and special concern species.

8.3.0.27 Develop educational outreach programs for public and private landowners and land managers regarding the importance of structural habitat diversity, methods to increase diversity, and/or incentive programs available to increase habitat diversity.

8.3.0.30 Develop educational outreach programs for private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.5 Develop a plan that directs the creation or expansion of energy or utility rights-of-way in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.6 Develop a plan that directs the creation or expansion of roads and railroads or the re-establishment of abandoned railroads within and adjacent to critical forested habitats in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.8 Develop a plan that focuses on strategies for oil pipelines to avoid sensitive habitats that would be highly impacted by oil spills.

9.1.0.9 Develop a plan that focuses on strategies to minimize the creation of renewable energy farms (e.g., solar, wind) and related infrastructures within and their impacts on forested habitats and the wildlife community.

9.1.0.10 Develop a plan that focuses on strategies to minimize the impacts of mining on critical forested habitats.

9.1.0.11 Develop a plan that focuses on strategies to minimize the impacts of power plants on critical forested habitats and the wildlife community.

9.1.0.13 Develop a plan to minimize agriculture that would result in groundwater withdrawal in critical forested areas.

9.1.0.15 Develop a plan to minimize fragmentation of terrestrial and aquatic habitats by roads.

9.1.0.16 Develop a plan to minimize new lawnscapes and preserve natural vegetation within and adjacent to critical forest areas.

9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

9.1.0.21 Develop a plan to minimize the use of any-sized dam in critical forested areas.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.2 Organizational strategic and CMS planning

9.2.1 Organizational strategic and operational planning

9.2.1.1 Identify and codify legal ORV access areas on state lands.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.5 Develop response plans to address disease outbreaks within wildlife populations, in particular SGCN.

9.3.1.7 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.10 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.15 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.1.16 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3 Habitat management planning

9.3.3.5 Develop a management plan using forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

9.3.3.7 Develop a management plan to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

9.3.3.8 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.3.13 Develop a management plan that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas and prevents or ameliorates near-term impacts of climate change throughout the State, but in particular within the coastal and Delaware Bay areas.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.16 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.3.17 Develop a management plan for prescribed burning that will benefit Pinelands dependent species and increase or maintain habitat quality for these species in the Pinelands.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.21 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.3.26 Develop a management plan for parcels of suitable size to be managed for native herbaceous plant species that support breeding grassland dependent species.

9.3.3.28 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.3.29 Develop habitat management plans aimed at reducing or eliminating negative impacts of ORVs.

9.3.3.32 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3.34 Include controlled burn prescriptions in forest and stewardship plans to improve wildlife habitat.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.12 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed solar farm projects to reduce habitat fragmentation and minimize impacts on wildlife.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.2 Provide technical support to public and private landowners and land managers for controlling invasive, native and non-native plant species in order to increase structural habitat diversity.

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.7 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on the importance of maintaining habitat connectivity, minimizing fragmentation, and the use of CHANJ products to help them target areas for such planning.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.11 Provide educational resources, training programs, and on-the-ground guidance to private and public landowners and land managers on the benefits of and for creating young forest and early succession habitat for SGCN.

11.2.0.15 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and landowners about the importance of retaining and in an effort to protect, create, enhance and/or restore vegetation along aquatic habitats.

11.2.0.17 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of vernal pools and the protection, enhancement and/or restoration of biologically appropriate buffers.

11.2.0.19 Provide educational resources and technical support to public and private landowners and land managers to promote the protection and/or enhancement of scrub-shrub habitats for SGCN.

11.2.0.22 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

11.2.0.23 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to SGCN habitats to promote the protection and/or enhancement of those adjacent habitats to increase the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and that connect conserved SGCN habitats.

11.2.0.24 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers on how to manage vegetated roadside areas (e.g., mowing, brush-hogging, etc.) on a schedule that avoids peak activity periods for wildlife and therefore, minimizes harm.

11.2.0.25 Provide educational resources, training programs, and on-the-ground guidance to resource managers regarding the assessment of and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) related to residential and commercial development.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.1 Engage partners and stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.3 Provide educational resources, training programs, and on-the-ground guidance to DOD to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop and implement forest management and other practices that minimize disturbances to SGCN (i.e., beyond their federal requirements).

11.2.1.5 Provide educational resources, training programs, and on-the-ground guidance to municipalities, state and federal agency resource managers on tasks such as writing and integrating Beach Management Plans into other management documents.

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

11.2.2 With private landowners

11.2.2.1 Provide technical support to farming operations and woodland landowners on ways to decrease clean farming (edge-to-edge) practices and create ecotones to benefit bobwhite and other species dependent on early successional habitat.

100 Law and Policy

100. Legislation

100.1.3 Sub-national Level

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.4 County and Local

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.3 Expand the acreages and enhance the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN through local ordinances.

100.1.4.12 Secure scrub-shrub habitats for SGCN through local ordinances.

100.1.4.14 Adopt/pass local ordinances which require assessing and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100.1.5.5 Develop legislation to provide financial support for the New Jersey Invasive Species Strike Team.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.5 Develop policies that will promote improved and secure habitat connections between conserved SGCN habitats.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.12 Develop policies that promote the preservation and protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.15 Develop policies that promote protecting and restoring scrub-shrub habitats to benefit shrub-dependent SGCN.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.23 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.31 Create or expand tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMPs.

100.3.0.32 Coordinate regulations across agencies to maximize availability of and enrollment in existing Forestry Stewardship Programs (e.g., "Woodland Stewards", Farm Bill, partners, etc.) to maintain and/or improve forest habitat.

100.3.0.38 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.3.0.39 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.3.0.40 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.45 Increase the controlled burn season to focus on restoring vegetative communities.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.48 Propose new State law or regulation mandating that a State-level "development impact fee" be assessed on all new development approved by municipalities (via the Municipal Land Use Law processes), and dedicate such monies to the development and implementation of regional Habitat Conservation Plans (or existing plans/programs serving the same regional function).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.53 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded rights-of-way corridors associated with energy transport/transmission.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.65 Develop regulations that when implemented will protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100.3.2 State Land Acquisition Programs

100.3.2.1 Increase opportunities for habitat restoration by making any necessary policy changes to state, federal and local land acquisition programs (e.g., Green Acres, Blue Acres, etc.) to allow for acquisition within abandoned or failing bay shore communities, including mechanisms to relocate displaced people and infrastructure.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.2 Create a policy that requires the NJ DEP to incorporate scientific information regarding climate change and sea level rise (e.g., predictions, habitat management/acquisition efforts to enhance resilience to inundation) on their websites and to work with other government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

100.4.0.3 Develop policies for mandatory buffer strips on preserved farmlands and state-owned agricultural lands.

100.4.0.8 Develop a white paper addressing the impacts that existing, new or expanded rights-of-way have upon wildlife, wildlife habitats and habitat connectivity.

100.4.0.10 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.4.0.11 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.4.0.12 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.4.0.13 Develop policies for different circumstances (e.g., roadsides and medians, riparian, aquatic and terrestrial habitats) that outline appropriate habitat/vegetation management strategies and schedules to minimize risks to and benefit wildlife.

100.4.0.16 Develop policies to implement habitat management strategies that will increase the structural diversity surrounding areas used for energy, mining, and transportation and service corridors which include but are not limited to the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-

100.4.0.17 Develop policies to implement habitat management strategies, including prescribed burns, that will increase the structural diversity on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies to control and reduce the impacts of invasive, non-native species in order to increase structural habitat diversity.

100.4.0.18 Develop policies to minimize the extent of infrastructure associated with energy and service corridors or areas (e.g., wind and solar farms, pipelines, utility lines) and that require the implementation of habitat management strategies that will increase the structural diversity in the area including (e.g., the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides).

100.4.0.19 Develop regulations that will minimize the creation of new barriers, remove or replace current barriers with appropriately-sized systems to accommodate wildlife dispersal, and to minimize road widening and traffic volume increases within critical wildlife habitat areas.

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.24 Develop policies to provide financial support for the New Jersey Invasive Species Strike Team.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Northern Metalmark

Focal species that comprise this Conservation Target:

Northern Metalmark

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:
- 1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.1.1.2 Loss, alteration and/or degradation of habitat.
- 1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:
- 1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.2.1.2 Loss, alteration and/or degradation of habitat.
- 1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:
- 1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.3.1.2 Loss, alteration and/or degradation of habitat.
- 1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture (Avg. Score: 1.00)

NJ Specific Threats:
- 2.1.1.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.
- 2.1.1.2 Conversion, and subsequent loss, of high salt marsh to low salt marsh threatens high-marsh dependent species and those dependent on the marsh-upland ecotone.
- 2.1.1.3 Conversion of agricultural landscape that results in increased erosion, runoff, and chemical and thermal pollution decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.1.2 Small-holder Farming (Avg. Score: 1.00)

NJ Specific Threats: 2.1.2.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.2.2 Fragments terrestrial and aquatic habitats.

2.1.3 Agro-industry (Avg. Score: 1.00)

NJ Specific Threats: 2.1.3.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.3.2 Fragments terrestrial and aquatic habitats.

2.1.3.5 Loss of ecotones by implementing clean farming (edge-to-edge) practices degrades habitat for early successional wildlife.

2.2 Wood and Pulp Plantations

2.2.1 Small Holder (Avg. Score: 1.00)

NJ Specific Threats: 2.2.1.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.2.2 Agro-industry Plantations (Avg. Score: 1.00)

NJ Specific Threats: 2.2.2.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.3 Livestock Farming and Ranching

2.3.2 Small-holder Grazing (Avg. Score: 1.00)

NJ Specific Threats: 2.3.2.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.2.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

2.3.2.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.2.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

2.3.3 Agro-industry Grazing (Avg. Score: 1.00)

NJ Specific Threats: 2.3.3.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.3.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

2.3.3.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.3.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

3 Energy Production and Mining

3.2 Mining and Quarrying

3.2.2 Surface Mining - Rock Quarry (and sand quarries) (Avg. Score: 1.00)

NJ Specific Threats: 3.2.2.1 Fragments terrestrial and aquatic habitats.

3.2.2.2 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

3.3 Renewable Energy

3.3.2 Solar Power (Avg. Score: 1.00)

NJ Specific Threats: 3.3.2.2 Loss, alteration and/or degradation of habitat.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.1.2 Movement of cars and other vehicles on roads and railroads (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 4.1.2.1 Increased vehicle traffic increases the risk of wildlife mortality from strikes.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads (Avg. Score: 1.00)

NJ Specific Threats: 4.2.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species, inhibiting dispersal of non-volant animals, reducing gene flow, and creating barriers to fish when service line-associated roads cross streams (e.g., bridges, culverts, fords, etc.).

4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

4.2.2 Management of rights-of-way or communication tower facilities and/or their associated access roads (Avg. Score: 2.00)

NJ Specific Threats: 4.2.2.1 Improper or poorly scheduled vegetation management can cause direct mortality to and may reduce productivity of wildlife.

5 Biological Resource Use

5.1 Hunting and Collecting Terrestrial Animals

5.1.1 Intentional Use (Avg. Score: 1.00)

NJ Specific Threats: 5.1.1.1 Illegal collection of wildlife can have detrimental impacts on populations.

5.2 Gathering Terrestrial Plants

5.2.3 Control (Avg. Score: 1.00)

NJ Specific Threats: 5.2.3.1 Alteration or control of undesirable plants or plant communities can destroy important food and nectar plants for native insects and animals.

5.3 Logging and Wood Harvesting

5.3.1 Intentional Use (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.1.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.1.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.1.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.1.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.1.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.1.6 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices in Atlantic White Cedar stands may destroy a unique wildlife wetland habitat that is difficult, and takes time, to restore.

5.3.2 Intentional Use (large scale) (Avg. Score: 1.00)

NJ Specific Threats:

5.3.2.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.2.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.2.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.2.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.2.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.2.6 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices in Atlantic White Cedar stands may destroy a unique wildlife wetland habitat that is difficult, and takes time, to restore.

5.3.3 Unintentional effects (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats:

5.3.3.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4 Unintentional effects (large scale) (Avg. Score: 1.00)

NJ Specific Threats:

5.3.4.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4.5 Lack of appropriate, sustainable forest management can lead to a decrease in forest habitat diversity, degraded habitat for many forest species, the loss of habitat for early-successional species, and/or the loss of unique habitats for species that need canopy breaks and multi-aged tree composition to fulfill various life history requirements.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized) (Avg. Score: 3.00)

NJ Specific Threats:

6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.

6.1.1.3 Increased risk of harassment that results in a change in wildlife behavior and/or direct mortality from vehicle strikes.

6.1.1.6 Off-road vehicles can be a mechanism of transference of wildlife diseases and invasive plant species if gear and apparel are not properly sanitized between sites.

7 Natural Systems Modifications

7.1 Fire and Fire Suppression

7.1.1 Increase in Fire Frequency/Intensity (Avg. Score: 1.00)

NJ Specific Threats:

7.1.1.1 Increase in frequency and intensity of wild fires as a result of droughts and heat waves drying out vegetation and litter.

7.1.1.2 Increase in frequency of wild fires as a result of illegal activities.

7.1.1.3 Unnatural fire regimes occurring as a result of military exercises.

7.1.1.4 Lack of diversity in age structure and composition of vegetation due to expansive, frequent fires.

7.1.2 Suppression of Fire Frequency/Intensity (Avg. Score: 1.00)

NJ Specific Threats: 7.1.2.1 Shift in vegetative communities as a result of suppression of natural fires.

7.1.2.2 Lack of diversity in age structure and composition of vegetation due to the suppression of fire.

7.3 Other Ecosystem Modifications

7.3.2 Inappropriate timing of mowing (Avg. Score: 3.00)

NJ Specific Threats: 7.3.2.1 Increased risk of direct mortality and/or reduced productivity of wildlife, as well as reduced use by migrating species.

7.3.4 Lack of natural disturbance patterns or ecosystem functions due to species loss (Avg. Score: 3.00)

NJ Specific Threats: 7.3.4.5 The lack of forest disturbance minimizes the diversity of herbaceous vegetation and other shrubs and trees that need a lot of sunlight to grow.

7.3.5 Poor habitat management (Avg. Score: 3.00)

NJ Specific Threats: 7.3.5.1 Improper or poorly scheduled maintenance of man-made corridors (e.g., roadsides and medians) can cause direct mortality to and may reduce productivity of wildlife.

7.3.5.2 Shifting from natural vegetation to lawns can cause increased temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

7.3.5.3 Vegetation clearing removes terrestrial and riparian corridors for animal movement, shelter, and resting areas.

7.3.5.4 Vegetation clearing or inappropriate alteration adjacent to aquatic habitats threatens aquatic species by degrading habitat and water quality (altering temperature and dissolved oxygen, increasing siltation and desiccation, etc.).

7.3.5.5 Habitat management that alters or removes vegetation without implementing long-term management increases the risk of invasive and exotic plants establishing themselves, outcompeting native vegetation.

7.3.5.6 Habitat management, including that which occurs on public and private lands, that does not consider timing and species' behaviors can result in the direct mortality and/or alteration or loss of habitat.

7.3.5.12 Lack of diversity in age structure and composition of vegetation due to lack of natural disturbances and/or vegetation management.

7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.1.1.1 Displace or outcompete native species for resources.

8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.

8.1.1.3 Invasive, non-native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

8.1.1.4 Invasive, non-native animals increase the risk of predation on native animals and/or herbivory on native vegetation.

8.1.1.5 Invasive, non-native animals and plants increase the risk of introduction and transference of diseases

8.1.1.6 Invasive, non-native plants may create physical barriers for some species.

8.1.4 Invasive non-native terrestrial/wetland animals (Avg. Score: 2.00)

NJ Specific Threats: 8.1.4.1 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.6 Invasive non-native fungal/bacterial diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.1.6.1 The introduction of non-native fungal and bacterial diseases threatens native populations and ecosystems.

8.2 Problematic Native Species/Diseases

8.2.2 Named Species (Avg. Score: 2.00)

NJ Specific Threats: 8.2.2.2 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.4 Problematic Species/Diseases of Unknown Origin

8.4.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.4.1.1 Non-native or poorly understood diseases and parasites could potentially impact native animals.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.3 Agricultural and Forestry Effluents

9.3.2 Soil Erosion and Sedimentation (Avg. Score: 1.00)

NJ Specific Threats: 9.3.2.2 Soil erosion and sedimentation limit the re-establishment of plants needed by terrestrial wildlife as cover and a food base.

9.3.3 Herbicides and Pesticides (Avg. Score: 3.00)

NJ Specific Threats: 9.3.3.1 Pesticides degrade terrestrial and aquatic habitats, especially streams, ponds and wetlands. Aquatic wildlife are particularly sensitive to these contaminants, which can cause developmental and behavioral abnormalities and reproductive failure. Some contaminants may bioaccumulate in predatory fish and birds and disrupt reproduction.

9.3.3.3 Use of pesticides can directly harm non-target species through direct contact and/or by reducing and/or contaminating their food supply.

9.3.3.4 Use of herbicides can destroy beneficial food and nectar plants for insects.

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture (Avg. Score: 3.00)

NJ Specific Threats: 9.3.5.1 Use of pesticides, insecticides, and/or herbicides can directly harm non-target species, such as amphibians and beneficial invertebrates through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5.2 Use of herbicides can destroy beneficial food and nectar plants for insects.

9.3.5.4 Improper use of current insecticides, such as those containing esfenvalerate, prallethrin, or piperonyl butoxide, or past use of pesticides containing chlordane still present in the soils, are toxic to various wildlife species, and can cause injury, mortality, or other effects that impair population viability.

9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.5 Air-Bourne Pollutants

9.5.1 Acid Rain (Avg. Score: 1.00)

NJ Specific Threats: 9.5.1.1 Causes acidification of water bodies, resulting in changes to aquatic and marine communities and reducing biodiversity, and creating conditions that are unsuitable for some aquatic (freshwater and marine) and semi-aquatic species that are sensitive to pH shifts.

9.5.4 Other (Avg. Score: 1.00)

NJ Specific Threats: 9.5.4.1 Dust and/or airborne sedimentation from construction sites, agricultural operations or related earth disturbances can introduce mineral or organic sediments into adjacent wildlife habitats, degrading their quality and suitability for wildlife short-term and/or long-term.

9.5.6 Herbicides and Pesticides (Avg. Score: 3.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 3.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.6 Phenology Shifting or Alteration

11.6.1 Phenology shifts related to pollination ecology (Avg. Score: 1.00)

NJ Specific Threats: 11.6.1.1 Alters inter-specific relationships of wildlife and vegetation, ultimately leading to detrimental impacts on the ecological system.

11.6.3 Phenology shifts related to species redistribution (Avg. Score: 1.00)

NJ Specific Threats: 11.6.3.1 Shifts in timing of species migration, breeding and hibernation, and available food resources, as a result of wildlife range shifts driven by climate change.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 3.00)

NJ Specific Threats: 12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.2 Lack of up-to-date existing information (Avg. Score: 3.00)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.3 Need to answer research question (Avg. Score: 3.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.4 Need to develop new technique (Avg. Score: 3.00)

NJ Specific Threats: 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 1.00)

NJ Specific Threats: 12.3.0.1 Regulatory habitat protections within state land use regulations are spatially limited to specific geographic areas (e.g., Pinelands, Coastal Area) or geographic features (e.g., wetlands, streams) and so fail to protect critical habitats that exist outside of these regulated areas.

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 1.00)

NJ Specific Threats: 12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.

12.4.0.5 Bureau of Forest Fire Management policy has traditionally implemented prescribed burns on State lands for the sole purpose of public safety (i.e., addressing hazard fuel reduction), missing opportunities to burn in a manner that would additionally manage habitat for ecological diversity.

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 3.00)

NJ Specific Threats: 14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 3.00)

NJ Specific Threats: 14.2.1.1 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various forest management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 1.00)

NJ Specific Threats: 15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.5 Secure and promote the protection/restoration of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through incentive programs.

1.2.1.6 Secure and promote the protection/restoration of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.9 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing Forestry Stewardship Programs.

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.12 Create incentives (non-monetary and/or monetary) for land developers to redevelop abandoned areas (e.g., shopping centers, office complexes) to minimize the loss of natural habitats and reduce the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.14 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of herbicides and pesticides, and implementing more ecologically safe strategies when using such products.

1.2.1.15 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of rodenticides, and implementing more ecologically safe strategies when using such products.

1.2.1.16 Create incentives (non-monetary and/or monetary) within State regulations (mitigations requirements or credit, BMP satisfaction, etc.) to promote the use of retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.17 Develop a public-relations oriented certification program for private retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.18 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and land managers to control and reduce the impacts of invasive, native and non-native species in order to increase structural habitat diversity.

1.2.1.19 Create incentives for federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to farmers, woodland landowners, and private landowners to adopt and/or endorse consistent BMPs concerning controlled burns to maintain and/or improve wildlife habitat.

1.2.1.20 Coordinate across government agencies and non-government organizations to create or expand upon tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMP's.

1.2.1.21 Create and/or support market-based programs that subsidize or create branding for products derived sustainably from managed wildlife habitats.

1.2.1.22 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to horse/livestock farm owners and managers to increase structural habitat diversity in and around the farms by managing vegetation for a variety of species, in particular, farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

1.2.1.23 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to provide cost shares and/or plan approvals for management based on management approaches and prescriptions.

1.2.1.24 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners, with habitat of suitable patch size to support breeding grassland-dependent species, to alter the timing of vegetation management to benefit grassland and pollinator species.

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

1.2.1.28 Create incentives to implement dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

2 Direct Management of Natural Resources

2.3 Fire management

2.3.2 Fuel reduction

2.3.2.1 Prevent wildfires by reducing natural fuel (e.g., leaf litter).

2.3.3 Prescribed burning

2.3.3.1 Evaluate different management techniques of prescribed burns that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

2.3.3.2 Conduct prescribed burning in Northern New Jersey forests to maintain and regenerate a mosaic of upland forest habitats.

2.3.3.3 Conduct prescribed burning to improve wildlife habitat.

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.1 Control invasive insect infestations by implementing BMP strategies through biological, chemical and/or mechanical means that will depress, or when appropriate, eradicate populations in a manner that avoids excessive harm to non-target species using BMPs to control infestations and limit their spread based on an inventory of invasive insect distribution and response to outbreaks.

2.8.0.2 Develop, implement, monitor and evaluate pest control/management strategies to reduce the impacts of over-abundant wildlife species (native and/or native, invasive species) on native vegetation and the degradation of habitats supporting SGCN. Over-abundant wildlife species include but are not limited to mute swans, Canada geese, beaver and white-tailed deer.

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.5 Implement biologically safe and appropriate control/management strategies, and where appropriate, eradication strategies to reduce the impacts and/or limit the distribution of invasive and/or non-native plant species within or near aquatic systems using methods that will provide the most protection to the aquatic and riparian ecological system, and minimize disturbance to the soil and wildlife. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.8.0.6 Implement long-term management of invasive and/or non-native plants to help maintain functioning ecological systems and biological diversity, and to enhance travel corridors. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.2 Improve the availability of prey/food resources through terrestrial and aquatic plantings and habitat restoration for SGCN populations, in particular for those populations thought to be limited due wholly or in part to a lack of (or contaminated) food resources, and for migratory species (birds, bats, invertebrates).

2.10.0.3 Restore and/or enhance habitats to benefit urban-associated SGCN.

2.10.0.4 Restore and/or enhance suitable travel corridors connecting conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.8 Protect significant natural and/or unique communities by implementing best management practices when conducting habitat restoration strategies.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.10 Minimize the loss of important habitats (e.g., coastal scrub-shrub and grassy habitats, high and low marsh habitats, etc.) that provide nesting, migrating, and wintering areas for SGCN birds and other coastal and marsh-dependent species through habitat restoration efforts.

2.10.0.11 Restore and/or enhance critical migratory terrestrial and aquatic habitats (e.g., beach, grasslands, forest, scrub-shrub, etc.) for songbirds, raptors, shorebirds, waterfowl, bats and invertebrates through habitat restoration efforts and expand habitat restoration to adjacent private lands to increase the effective size of the habitat.

2.10.0.12 Create and/or maintain scrub-shrub habitats through revegetation efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.15 Restore and/or enhance terrestrial and aquatic habitats proximate to but not adjacent to roads and other transportation corridors for terrestrial-bound SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.10.0.21 Restore and/or enhance understory habitats that suppress invasive species and provide critical resources and enhance sheltering, foraging, and nesting cover for wildlife.

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.11.0.3 Create suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats through vegetation management.

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through vegetation management.

2.11.0.6 Reclaim degraded rare species habitats by conducting vegetation management needed to restore habitat value for the documented/target SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.23 Implement appropriate habitat management actions in areas where natural disturbances, such as wildfire, have been precluded.

2.11.0.24 Conduct vegetation management adjacent to aquatic habitats following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.25 Conduct vegetation management along access roads following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.26 Conduct vegetation management along roadsides and medians, avoiding peak activity periods for wildlife, that enhances wildlife dispersal naturally and safely across roads and similar barriers to/between terrestrial and/or aquatic habitats.

2.11.0.27 Conduct vegetation management for target shrub- or young forest-dependent SGCN following BMPs to minimize the risk of the establishment of invasive and non-native plants.

2.11.0.28 Conduct vegetation management in agricultural areas following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.29 Conduct vegetation management on transportation and service corridors (i.e., rights-of-way) following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.30 Identify and prioritize areas where various management tools (such as increasing salinity through the management of water levels or chemical applications) may be effective in reducing phragmites within and restoring marsh habitat.

2.11.0.31 In areas where vegetative communities are shifting due to fire suppression and controlled burns are not feasible, manage vegetation to improve wildlife habitat.

2.11.0.32 Increase structural habitat diversity around and when feasible, within agricultural landscapes by managing vegetation for a variety of species, in particular, those farms that have removed scrub-shrub habitat and/or fragmented forests, and by implementing ecologically best practices (e.g., no-till farming, maintaining hedgerows, buffer set-asides, etc.).

2.11.0.33 Increase structural habitat diversity by implementing long-term vegetation management to minimize the potential for the establishment of invasive and/or non-native plants that may outcompete native vegetation.

2.11.0.34 Increase structural habitat diversity by managing residential, commercial and recreational areas' landscapes for a variety of species. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.

2.11.0.38 Increase structural habitat diversity in and around horse/livestock farms by managing vegetation for a variety of species, in particular, in and around farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

2.11.0.39 Increase structural habitat diversity in and around solar farms by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.40 Increase structural habitat diversity surrounding areas used for energy, mining, and transportation and service corridors by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides, and avoid managing habitat during the breeding seasons for ground-nesting birds, reptiles, amphibians and small mammals.

2.11.0.41 Increase structural habitat diversity through the implementation of a variety of vegetation management practices such a prescribed burns (either increasing or decreasing their frequency depending on the site and objective), plantings, etc. that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.42 Increase structural habitat diversity within wind farms for terrestrial bound and low-flying species and around wind farms for other wildlife by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.43 Manage forests to increase variation in age structure and composition using BMPs that promote and maintain functioning ecological forest-based systems and biological diversity.

2.11.0.45 Regularly and/or rotationally create young forest habitat in targeted areas to maintain and regenerate a mosaic of upland forest habitats that will benefit shrub- and young forest-dependent species.

2.14 Wildlife disease management

2.14.0 Wildlife disease strategy development and investigation

2.14.0.1 Investigate diseases/pathogens impacting SGCN and/or their habitats.

2.14.0.2 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

2.14.0.3 Protect SGCN from exotic pathogen introduction or incident through implementation of a "rapid response plan"; DFW to give priority attention to these species in planning and/or implementing a response.

2.14.0.4 Conduct long-term monitoring of diseases in vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts.

2.14.0.5 Assess the impacts of diseases on the life cycles of wildlife.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.14 Identify areas with invasive, aquatic plants and animals and collect a detailed baseline assessment of the species' status and distribution. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort. Researchers and contractors performing Forest Stewardship Inventories and/or Plans on state lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.0.0.15 Conduct long-term monitoring of areas identified as having invasive, aquatic plants and animals to track the species' status/progress over time with or without the implementation of management strategies. Areas without management strategies should be assessed and prioritized for management/control. Areas where management strategies are being implemented should include an assessment of the management effort and identify/recommend and implement necessary changes to improve its success. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort.

3.0.0.26 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species including objectives and guidance pertaining to and the condition/status of critical and supporting habitats.

3.0.0.27 Evaluate the effectiveness of strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals through research and monitoring. Develop and provide NJ DEP and other appropriate governing agencies/commissions a summary of findings and recommendations to improve such efforts.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.7 Track (via a database that includes a GIS component) and research problematic species and diseases to determine their distribution, impacts on SGCN wildlife/wildlife communities, and develop potential control measures.

3.2.0.8 Implement and conduct long-term monitoring of control measures aimed at minimizing the impacts of problematic species and/or diseases to evaluate the effectiveness of such efforts and to identify and incorporate additional strategies as appropriate.

3.2.0.18 Conduct baseline surveys/inventories to better understand the distribution of fish and invertebrate (including freshwater mussels) populations.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.2 Age, size and sex structure

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.3 Baseline inventory

3.2.3.9 Investigate hazardous environmental issues that may impact grassland invertebrates.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.6 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) that could, through revegetation and/or enhancement efforts, become suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN.

3.3.1.7 Map and prioritize existing and potential areas for early succession forest management. Share the results with state, county and municipal planners.

3.3.1.9 Inventory forests throughout northern New Jersey to develop a baseline characterization of the structure and composition of habitats and identify deficient forest habitat types.

3.3.1.10 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and document fish SGCN habitats by plotting their distributions in GIS and submitting the data to the State for integration into the DEP's Biotics database.

3.3.1.16 Gather "best information" for spatial modeling and update/create a current model/depiction of anticipated habitat shifts from sea-level rise, flooding, etc.

3.3.1.17 Identify and map undeveloped roads and trails in all conserved forests, and create a database of locations. Integrate information regarding potentially sensitive areas.

3.3.1.18 Conduct an assessment using available data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels.

3.3.1.19 Identify and codify legal ORV access areas on state (and if appropriate, other conserved) lands. Provide GIS mapping to the landowner for potential use in directing such recreational activities.

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.2 Monitoring

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.9 Investigate the effectiveness of various silviculture techniques for enhancing forests for forest-dependent SGCN.

3.3.2.10 Evaluate the efficacy and success of different management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.3.2.15 Investigate the effectiveness of management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.3.2.20 Once a system is developed for reporting and qualifying new locations of invasive species, develop, implement and monitor/evaluate invasive species removal strategies at identified locations. Priority should be given to those areas critical to SGCN and/or contain unique and/or rare plant communities supporting SGCN and/or other fish/wildlife species.

3.3.2.24 Conduct regular inventories of forests throughout northern New Jersey to characterize the changing structure and composition of habitats and monitor forest conditions.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.3 Develop/improve management techniques that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.9 Develop strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.3.16 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.3.21 Develop management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.24 Based on research, modify management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.5 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

3.5.4.6 Investigate the feasibility of mitigating for the impacts of contaminants to vulnerable wildlife, particularly SGCN. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.5.4.14 Develop and implement agreements, and update existing agreements, with government agencies regarding the protection of critical SGCN habitats (e.g., significant breeding populations of beach nesting birds, colonial waterbird nesting areas, bat colonies, etc.).

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.18 Investigate the effectiveness of survey techniques through selected “ground truthing” and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

3.5.4.21 Develop BMPs to address problematic species and diseases of unknown origin.

4 Education

4.1 Educator/Instructor training

4.1.0 Public education

4.1.0.1 Provide educational resources and training programs to private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

5 Facilities and Areas

5.15 Wildlife Management Areas

5.15.6 Roads

5.15.6.1 Clearly post areas/roads where vehicle access is permitted.

5.15.6.2 Clearly post areas/trails where vehicle access is not permitted.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.7 Secure and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.8 Secure and protect scrub-shrub habitats for SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.8 Promote the protection of scrub-shrub habitats for SGCN through conservation area designations.

7 Law Enforcement

7.1 Law enforcement

7.1.3 Sub-national Level

7.1.3.2 Increase the number of law enforcement officers tending to wildlife issues to a reasonable number to sufficiently cover the State and marine waters.

7.1.4 Scale Unspecified

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.19 Implement policies that protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

7.1.4.26 Educate law enforcement personnel that there may be unauthorized research projects taking place and to encourage them to investigate any activities that appear to be harmful to wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.2 Develop a team of personnel from government entities, conservation organizations and other stakeholders engaged in oil/gas spill response for marine and freshwater habitats to develop a feasible plan for oil spill response and/or to amend NJ's current oil spill response plan that clearly outlines each organizations responsibilities and an assessment and location list of available equipment for boom deployment during oil spills.

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.1.0.4 Engage government agencies, conservation partners and other stakeholders in constructive dialogues encouraging them to influence policy change and the creation of incentives through a habitat bill and/or municipal ordinances for backyard habitat.

8.1.0.15 Engage government agencies, conservation partners and other stakeholders in discussions encouraging and supporting the creation of laws and policies requiring vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

8.1.0.16 Engage local governments in discussions regarding the importance of them adopting/passing ordinances which require assessing and addressing secondary impacts (i.e., ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

8.1.0.17 Engage municipalities in constructive dialogue to identify and minimize destruction of areas prioritized for early succession forest management.

8.1.0.18 Engage NJDOT, NJ Transit Authority and other road management entities, wildlife conservation organizations/agencies (e.g., Division of Fish and Wildlife, New Jersey Conservation Foundation, Conserve Wildlife Foundation of NJ), and communities and citizens in discussions regarding the importance of and methods to enhance habitat connectivity, and work together to develop feasible strategies for ensuring that wildlife can disperse naturally and safely across roads and similar barriers to terrestrial and/or aquatic habitats.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.20 Organize a small focal group of government and non-government agencies/organizations responsible for decisions regarding beach/dune management to share and coordinate their goals so that comprehensive planning can attempt to meet all needs.

8.1.0.21 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation human-subsidized and/or overabundant, native species cause to local nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.22 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation invasive species cause to native nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.26 Coordinate across federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to woodland landowners to adopt or endorse consistent best management practices concerning controlled burns to maintain and/or improve forested habitat for wildlife.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.34 Work with the NJ Education Association and Department of Education to design curriculum and outdoor experimental learning opportunities, and provide training to teachers on implementation of these activities.

8.1.0.37 Enlist landowners and NJ citizens in the protection of and survey efforts for SGCN, in particular rare species, by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management and wildlife-related volunteer programs.

8.1.0.38 Engage partners, stakeholders and land managers in constructive dialogue promoting forest stewardship for SGCN that use core forests and forested corridors.

8.1.0.40 Encourage researchers, land managers, naturalists and enthusiasts to follow proper procedures for the coordination and/or permitting of research/management activities involving wildlife and sensitive habitats, and discourage activities that alter vegetation or wetlands, or cause harm or disturbance to wildlife.

8.1.0.42 Engage citizens, wildlife observers and photographers through discussions and distributable information regarding the importance of and encouraging implementing responsible and ethical behavior when observing wildlife by developing an alliance of wildlife photographers and widely circulating recommendations on how to reduce impact.

8.1.0.44 Engage conservation partners, stakeholders, government agencies and other land stewards in constructive dialogues encouraging their inclusion of controlled burns in forest and other stewardship plans.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.1.0.48 Form cooperative partnerships with transportation and shipment agencies and companies to facilitate habitat creation and enhancement away from and outside of project areas and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.2 Recruitment and retention activities

8.2.3 For wildlife watching

8.2.3.1 Develop and implement nature-focused tourism opportunities including wildlife viewing sites, interpretive signage highlighting unique ecosystems/habitats, and wildlife-related recreational opportunities that do not negatively impact SGCN or their habitats.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.7 Develop and provide (or otherwise make publicly available) educational programs and/or materials that describe the negative impacts of off-road vehicles and watercraft use in and adjacent to critical SGCN habitats, and the importance of confining such activities to more appropriate locations and/or seasons.

8.3.0.8 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate recreationists and encourage landowners to eliminate garbage in the vicinity of suitable wildlife habitat, in particular SGCN habitat. Information should include the detrimental impacts garbage may have on various wildlife species.

8.3.0.9 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners and land managers to include only native plants in landscaping and restoration projects. Provide information to assist them in detecting problematic establishment of invasive, non-indigenous plants.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.11 Develop and provide (or otherwise make publicly available) educational programs and/or materials to the public, wildlife-related professionals, foresters, etc., that describe the value of species that are often feared (e.g., snakes, bats, spiders, Allegheny woodrat) and/or deemed a "nuisance" (e.g., squirrel, deer, snapping turtle), and therefore, persecuted by people. Include information on tolerance, proper identification, eviction from human dwellings, how to minimize the animal's presence on the property, and/or how to live in harmony with the animal.

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.24 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

8.3.0.25 Develop educational outreach programs for landowners, nurseries and the general public regarding the negative impacts of invasive and non-native plants on our natural communities.

8.3.0.26 Develop educational outreach programs for private and public landowners and land managers regarding the importance of and how to manage core forests and forested corridors in a way that will be beneficial for SGCN, particularly endangered, threatened and special concern species.

8.3.0.27 Develop educational outreach programs for public and private landowners and land managers regarding the importance of structural habitat diversity, methods to increase diversity, and/or incentive programs available to increase habitat diversity.

8.3.0.30 Develop educational outreach programs for private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.5 Develop a plan that directs the creation or expansion of energy or utility rights-of-way in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.6 Develop a plan that directs the creation or expansion of roads and railroads or the re-establishment of abandoned railroads within and adjacent to critical forested habitats in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.8 Develop a plan that focuses on strategies for oil pipelines to avoid sensitive habitats that would be highly impacted by oil spills.

9.1.0.9 Develop a plan that focuses on strategies to minimize the creation of renewable energy farms (e.g., solar, wind) and related infrastructures within and their impacts on forested habitats and the wildlife community.

9.1.0.10 Develop a plan that focuses on strategies to minimize the impacts of mining on critical forested habitats.

9.1.0.11 Develop a plan that focuses on strategies to minimize the impacts of power plants on critical forested habitats and the wildlife community.

9.1.0.13 Develop a plan to minimize agriculture that would result in groundwater withdrawal in critical forested areas.

9.1.0.15 Develop a plan to minimize fragmentation of terrestrial and aquatic habitats by roads.

9.1.0.16 Develop a plan to minimize new lawnscapes and preserve natural vegetation within and adjacent to critical forest areas.

9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

9.1.0.21 Develop a plan to minimize the use of any-sized dam in critical forested areas.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.2 Organizational strategic and CMS planning

9.2.1 Organizational strategic and operational planning

9.2.1.1 Identify and codify legal ORV access areas on state lands.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.5 Develop response plans to address disease outbreaks within wildlife populations, in particular SGCN.

9.3.1.7 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.10 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.15 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.1.16 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3 Habitat management planning

9.3.3.5 Develop a management plan using forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

9.3.3.7 Develop a management plan to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

9.3.3.8 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.3.13 Develop a management plan that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas and prevents or ameliorates near-term impacts of climate change throughout the State, but in particular within the coastal and Delaware Bay areas.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.16 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.21 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.3.28 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.3.29 Develop habitat management plans aimed at reducing or eliminating negative impacts of ORVs.

9.3.3.32 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3.34 Include controlled burn prescriptions in forest and stewardship plans to improve wildlife habitat.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.12 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed solar farm projects to reduce habitat fragmentation and minimize impacts on wildlife.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.2 Provide technical support to public and private landowners and land managers for controlling invasive, native and non-native plant species in order to increase structural habitat diversity.

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.7 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on the importance of maintaining habitat connectivity, minimizing fragmentation, and the use of CHANJ products to help them target areas for such planning.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.11 Provide educational resources, training programs, and on-the-ground guidance to private and public landowners and land managers on the benefits of and for creating young forest and early succession habitat for SGCN.

11.2.0.15 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and landowners about the importance of retaining and in an effort to protect, create, enhance and/or restore vegetation along aquatic habitats.

11.2.0.17 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of vernal pools and the protection, enhancement and/or restoration of biologically appropriate buffers.

11.2.0.19 Provide educational resources and technical support to public and private landowners and land managers to promote the protection and/or enhancement of scrub-shrub habitats for SGCN.

11.2.0.22 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

11.2.0.23 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to SGCN habitats to promote the protection and/or enhancement of those adjacent habitats to increase the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and that connect conserved SGCN habitats.

11.2.0.24 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers on how to manage vegetated roadside areas (e.g., mowing, brush-hogging, etc.) on a schedule that avoids peak activity periods for wildlife and therefore, minimizes harm.

11.2.0.25 Provide educational resources, training programs, and on-the-ground guidance to resource managers regarding the assessment of and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) related to residential and commercial development.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.1 Engage partners and stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.3 Provide educational resources, training programs, and on-the-ground guidance to DOD to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop and implement forest management and other practices that minimize disturbances to SGCN (i.e., beyond their federal requirements).

11.2.1.5 Provide educational resources, training programs, and on-the-ground guidance to municipalities, state and federal agency resource managers on tasks such as writing and integrating Beach Management Plans into other management documents.

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

11.2.2 With private landowners

11.2.2.1 Provide technical support to farming operations and woodland landowners on ways to decrease clean farming (edge-to-edge) practices and create ecotones to benefit bobwhite and other species dependent on early successional habitat.

100 Law and Policy

100. Legislation

100.1.3 Sub-national Level

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.4 County and Local

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.3 Expand the acreages and enhance the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN through local ordinances.

100.1.4.14 Adopt/pass local ordinances which require assessing and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100.1.5.5 Develop legislation to provide financial support for the New Jersey Invasive Species Strike Team.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.5 Develop policies that will promote improved and secure habitat connections between conserved SGCN habitats.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.12 Develop policies that promote the preservation and protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.23 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.31 Create or expand tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMPs.

100.3.0.32 Coordinate regulations across agencies to maximize availability of and enrollment in existing Forestry Stewardship Programs (e.g., "Woodland Stewards", Farm Bill, partners, etc.) to maintain and/or improve forest habitat.

100.3.0.38 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.3.0.39 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.3.0.40 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.45 Increase the controlled burn season to focus on restoring vegetative communities.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.48 Propose new State law or regulation mandating that a State-level "development impact fee" be assessed on all new development approved by municipalities (via the Municipal Land Use Law processes), and dedicate such monies to the development and implementation of regional Habitat Conservation Plans (or existing plans/programs serving the same regional function).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.53 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded rights-of-way corridors associated with energy transport/transmission.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.65 Develop regulations that when implemented will protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100.3.0.73 Develop regulations that would exempt the conversion of lawns to native vegetation (beneficial to wildlife) from local lawn ordinances.

100.3.2 State Land Acquisition Programs

100.3.2.1 Increase opportunities for habitat restoration by making any necessary policy changes to state, federal and local land acquisition programs (e.g., Green Acres, Blue Acres, etc.) to allow for acquisition within abandoned or failing bay shore communities, including mechanisms to relocate displaced people and infrastructure.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.2 Create a policy that requires the NJ DEP to incorporate scientific information regarding climate change and sea level rise (e.g., predictions, habitat management/acquisition efforts to enhance resilience to inundation) on their websites and to work with other government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

100.4.0.3 Develop policies for mandatory buffer strips on preserved farmlands and state-owned agricultural lands.

100.4.0.8 Develop a white paper addressing the impacts that existing, new or expanded rights-of-way have upon wildlife, wildlife habitats and habitat connectivity.

100.4.0.10 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.4.0.11 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.4.0.12 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.4.0.13 Develop policies for different circumstances (e.g., roadsides and medians, riparian, aquatic and terrestrial habitats) that outline appropriate habitat/vegetation management strategies and schedules to minimize risks to and benefit wildlife.

100.4.0.16 Develop policies to implement habitat management strategies that will increase the structural diversity surrounding areas used for energy, mining, and transportation and service corridors which include but are not limited to the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-

100.4.0.17 Develop policies to implement habitat management strategies, including prescribed burns, that will increase the structural diversity on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies to control and reduce the impacts of invasive, non-native species in order to increase structural habitat diversity.

100.4.0.18 Develop policies to minimize the extent of infrastructure associated with energy and service corridors or areas (e.g., wind and solar farms, pipelines, utility lines) and that require the implementation of habitat management strategies that will increase the structural diversity in the area including (e.g., the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides).

100.4.0.19 Develop regulations that will minimize the creation of new barriers, remove or replace current barriers with appropriately-sized systems to accommodate wildlife dispersal, and to minimize road widening and traffic volume increases within critical wildlife habitat areas.

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.24 Develop policies to provide financial support for the New Jersey Invasive Species Strike Team.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Papaipema harrisii

Focal species that comprise this Conservation Target:

Papaipema harrisii

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:
- 1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.1.1.2 Loss, alteration and/or degradation of habitat.
- 1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:
- 1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.2.1.2 Loss, alteration and/or degradation of habitat.
- 1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:
- 1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.3.1.2 Loss, alteration and/or degradation of habitat.
- 1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.2 Small-holder Farming (Avg. Score: 1.00)

NJ Specific Threats:
- 2.1.2.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.
- 2.1.2.2 Fragments terrestrial and aquatic habitats.

2.1.3 Agro-industry (Avg. Score: 3.00)

NJ Specific Threats:
- 2.1.3.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.
- 2.1.3.2 Fragments terrestrial and aquatic habitats.

2.2 Wood and Pulp Plantations

2.2.1 Small Holder (Avg. Score: 2.00)

NJ Specific Threats: 2.2.1.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.2.2 Agro-industry Plantations (Avg. Score: 3.00)

NJ Specific Threats: 2.2.2.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.3 Livestock Farming and Ranching

2.3.2 Small-holder Grazing (Avg. Score: 1.00)

NJ Specific Threats: 2.3.2.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.2.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

2.3.2.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.2.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

2.3.3 Agro-industry Grazing (Avg. Score: 1.00)

NJ Specific Threats: 2.3.3.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.3.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

2.3.3.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.3.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

3 Energy Production and Mining

3.2 Mining and Quarrying

3.2.2 Surface Mining - Rock Quarry (and sand quarries) (Avg. Score: 2.00)

NJ Specific Threats: 3.2.2.1 Fragments terrestrial and aquatic habitats.

3.2.2.2 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

3.3 Renewable Energy

3.3.1 Wind Power (Avg. Score: 1.00)

NJ Specific Threats: 3.3.1.2 Fragments terrestrial habitats.

3.3.1.3 Loss, alteration and/or degradation of habitat.

3.3.2 Solar Power (Avg. Score: 2.00)

NJ Specific Threats: 3.3.2.1 Fragments terrestrial habitats.

3.3.2.2 Loss, alteration and/or degradation of habitat.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats: 4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads (Avg. Score: 1.00)

NJ Specific Threats: 4.2.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species, inhibiting dispersal of non-volant animals, reducing gene flow, and creating barriers to fish when service line-associated roads cross streams (e.g., bridges, culverts, fords, etc.).

4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

4.2.2 Management of rights-of-way or communication tower facilities and/or their associated access roads (Avg. Score: 1.00)

NJ Specific Threats: 4.2.2.1 Improper or poorly scheduled vegetation management can cause direct mortality to and may reduce productivity of wildlife.

5 Biological Resource Use

5.1 Hunting and Collecting Terrestrial Animals

5.1.1 Intentional Use (Avg. Score: 1.00)

NJ Specific Threats: 5.1.1.1 Illegal collection of wildlife can have detrimental impacts on populations.

5.1.3 Persecution/Control (Avg. Score: 2.00)

NJ Specific Threats: 5.1.3.1 Wanton killing of perceived dangerous and/or undesirable animals.

5.3 Logging and Wood Harvesting

5.3.1 Intentional Use (subsistence/small scale) (Avg. Score: 2.00)

NJ Specific Threats: 5.3.1.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.1.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.1.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.1.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.1.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.1.6 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices in Atlantic White Cedar stands may destroy a unique wildlife wetland habitat that is difficult, and takes time, to restore.

5.3.2 Intentional Use (large scale) (Avg. Score: 3.00)

NJ Specific Threats: 5.3.2.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.2.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.2.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.2.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.2.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.2.6 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices in Atlantic White Cedar stands may destroy a unique wildlife wetland habitat that is difficult, and takes time, to restore.

5.3.3 Unintentional effects (subsistence/small scale) (Avg. Score: 2.00)

NJ Specific Threats: 5.3.3.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.3.2 Poorly planned/implemented tree harvesting adjacent to waterways and vernal pools can lead to increased water temperatures, soil erosion and sedimentation, and reduces the potential for woody debris within the aquatic system, leading to negative impacts on wildlife.

5.3.4 Unintentional effects (large scale) (Avg. Score: 3.00)

NJ Specific Threats: 5.3.4.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4.3 Poorly planned/implemented tree harvesting adjacent to waterways and vernal pools can lead to increased water temperatures, soil erosion and sedimentation, and reduces the potential for woody debris within the aquatic system, leading to negative impacts on wildlife.

5.3.4.4 Infrastructure and/or equipment use may result in subtle changes to drainage patterns, adversely affecting vernal pool and wetland hydrology.

5.3.4.5 Lack of appropriate, sustainable forest management can lead to a decrease in forest habitat diversity, degraded habitat for many forest species, the loss of habitat for early-successional species, and/or the loss of unique habitats for species that need canopy breaks and multi-aged tree composition to fulfill various life history requirements.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized) (Avg. Score: 2.00)

NJ Specific Threats: 6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.

6.1.1.3 Increased risk of harassment that results in a change in wildlife behavior and/or direct mortality from vehicle strikes.

6.1.1.6 Off-road vehicles can be a mechanism of transference of wildlife diseases and invasive plant species if gear and apparel are not properly sanitized between sites.

7 Natural Systems Modifications

7.1 Fire and Fire Suppression

7.1.1 Increase in Fire Frequency/Intensity (Avg. Score: 2.00)

NJ Specific Threats: 7.1.1.1 Increase in frequency and intensity of wild fires as a result of droughts and heat waves drying out vegetation and litter.

7.1.1.2 Increase in frequency of wild fires as a result of illegal activities.

7.1.1.3 Unnatural fire regimes occurring as a result of military exercises.

7.1.1.4 Lack of diversity in age structure and composition of vegetation due to expansive, frequent fires.

7.1.2 Suppression of Fire Frequency/Intensity (Avg. Score: 2.00)

NJ Specific Threats:
- 7.1.2.1 Shift in vegetative communities as a result of suppression of natural fires.
- 7.1.2.2 Lack of diversity in age structure and composition of vegetation due to the suppression of fire.

7.3 Other Ecosystem Modifications

7.3.4 Lack of natural disturbance patterns or ecosystem functions due to species loss (Avg. Score: 2.00)

NJ Specific Threats:
- 7.3.4.5 The lack of forest disturbance minimizes the diversity of herbaceous vegetation and other shrubs and trees that need a lot of sunlight to grow.

7.3.5 Poor habitat management (Avg. Score: 3.00)

NJ Specific Threats:
- 7.3.5.1 Improper or poorly scheduled maintenance of man-made corridors (e.g., roadsides and medians) can cause direct mortality to and may reduce productivity of wildlife.
- 7.3.5.2 Shifting from natural vegetation to lawns can cause increased temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.
- 7.3.5.3 Vegetation clearing removes terrestrial and riparian corridors for animal movement, shelter, and resting areas.
- 7.3.5.4 Vegetation clearing or inappropriate alteration adjacent to aquatic habitats threatens aquatic species by degrading habitat and water quality (altering temperature and dissolved oxygen, increasing siltation and desiccation, etc.).
- 7.3.5.5 Habitat management that alters or removes vegetation without implementing long-term management increases the risk of invasive and exotic plants establishing themselves, outcompeting native vegetation.
- 7.3.5.6 Habitat management, including that which occurs on public and private lands, that does not consider timing and species' behaviors can result in the direct mortality and/or alteration or loss of habitat.
- 7.3.5.12 Lack of diversity in age structure and composition of vegetation due to lack of natural disturbances and/or vegetation management.
- 7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species (Avg. Score: 3.00)

NJ Specific Threats:
- 8.1.1.1 Displace or outcompete native species for resources.
- 8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.
- 8.1.1.3 Invasive, non-native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.
- 8.1.1.4 Invasive, non-native animals increase the risk of predation on native animals and/or herbivory on native vegetation.
- 8.1.1.6 Invasive, non-native plants may create physical barriers for some species.

8.1.4 Invasive non-native terrestrial/wetland animals (Avg. Score: 2.00)

NJ Specific Threats:
- 8.1.4.1 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.5 Invasive non-native terrestrial/wetland plants (Avg. Score: 3.00)

NJ Specific Threats: 8.1.5.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.6 Invasive non-native fungal/bacterial diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.1.6.1 The introduction of non-native fungal and bacterial diseases threatens native populations and ecosystems.

8.2 Problematic Native Species/Diseases

8.2.2 Named Species (Avg. Score: 3.00)

NJ Specific Threats: 8.2.2.2 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.4 Problematic Species/Diseases of Unknown Origin

8.4.1 Unspecified Species (Avg. Score: 2.00)

NJ Specific Threats: 8.4.1.1 Non-native or poorly understood diseases and parasites could potentially impact native animals.

8.5 Viral/Prion-induced Diseases

8.5.1 Unspecified Species (Disease) (Avg. Score: 1.00)

NJ Specific Threats: 8.5.1.1 There is a large knowledge gap regarding the existence of, or potential for, other diseases impacting native wildlife.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.2 Industrial and Military Effluents

9.2.4 Other: Hydrofracturing (Avg. Score: 1.00)

NJ Specific Threats: 9.2.4.1 Contaminants from hydrofracturing degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2.4.2 Uncontrolled effluents escaping from hydrofracturing facilities can cause injury to wildlife and alter normal behaviors.

9.3 Agricultural and Forestry Effluents

9.3.3 Herbicides and Pesticides (Avg. Score: 3.00)

NJ Specific Threats: 9.3.3.1 Pesticides degrade terrestrial and aquatic habitats, especially streams, ponds and wetlands. Aquatic wildlife are particularly sensitive to these contaminants, which can cause developmental and behavioral abnormalities and reproductive failure. Some contaminants may bioaccumulate in predatory fish and birds and disrupt reproduction.

9.3.3.3 Use of pesticides can directly harm non-target species through direct contact and/or by reducing and/or contaminating their food supply.

9.3.3.4 Use of herbicides can destroy beneficial food and nectar plants for insects.

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture (Avg. Score: 3.00)

NJ Specific Threats: 9.3.5.1 Use of pesticides, insecticides, and/or herbicides can directly harm non-target species, such as amphibians and beneficial invertebrates through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5.2 Use of herbicides can destroy beneficial food and nectar plants for insects.

9.3.5.4 Improper use of current insecticides, such as those containing esfenvalerate, prallethrin, or piperonyl butoxide, or past use of pesticides containing chlordane still present in the soils, are toxic to various wildlife species, and can cause injury, mortality, or other effects that impair population viability.

9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.5 Air-Bourne Pollutants

9.5.1 Acid Rain (Avg. Score: 1.00)

NJ Specific Threats: 9.5.1.1 Causes acidification of water bodies, resulting in changes to aquatic and marine communities and reducing biodiversity, and creating conditions that are unsuitable for some aquatic (freshwater and marine) and semi-aquatic species that are sensitive to pH shifts.

9.5.4 Other (Avg. Score: 1.00)

NJ Specific Threats: 9.5.4.1 Dust and/or airborne sedimentation from construction sites, agricultural operations or related earth disturbances can introduce mineral or organic sediments into adjacent wildlife habitats, degrading their quality and suitability for wildlife short-term and/or long-term.

9.5.6 Herbicides and Pesticides (Avg. Score: 3.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 3.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.2 Droughts

11.2.1 Droughts (Avg. Score: 2.00)

NJ Specific Threats: 11.2.1.1 Contribute to hardened soils, decreasing water recharge during rains and increasing the likelihood of flash floods during storms.

11.2.1.2 Lead to lower groundwater levels and therefore, less available water for people and habitats.

11.6 Phenology Shifting or Alteration

11.6.1 Phenology shifts related to pollination ecology (Avg. Score: 1.00)

NJ Specific Threats: 11.6.1.1 Alters inter-specific relationships of wildlife and vegetation, ultimately leading to detrimental impacts on the ecological system.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 3.00)

NJ Specific Threats: 12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.2 Lack of up-to-date existing information (Avg. Score: 3.00)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.3 Need to answer research question (Avg. Score: 3.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.4 Need to develop new technique (Avg. Score: 3.00)

NJ Specific Threats: 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 1.00)

NJ Specific Threats: 12.3.0.1 Regulatory habitat protections within state land use regulations are spatially limited to specific geographic areas (e.g., Pinelands, Coastal Area) or geographic features (e.g., wetlands, streams) and so fail to protect critical habitats that exist outside of these regulated areas.

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 1.00)

NJ Specific Threats: 12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.

12.4.0.5 Bureau of Forest Fire Management policy has traditionally implemented prescribed burns on State lands for the sole purpose of public safety (i.e., addressing hazard fuel reduction), missing opportunities to burn in a manner that would additionally manage habitat for ecological diversity.

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 3.00)

NJ Specific Threats: 14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 3.00)

NJ Specific Threats: 14.2.1.1 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various forest management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 1.00)

NJ Specific Threats: 15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.5 Secure and promote the protection/restoration of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through incentive programs.

1.2.1.6 Secure and promote the protection/restoration of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.9 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing Forestry Stewardship Programs.

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.12 Create incentives (non-monetary and/or monetary) for land developers to redevelop abandoned areas (e.g., shopping centers, office complexes) to minimize the loss of natural habitats and reduce the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.14 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of herbicides and pesticides, and implementing more ecologically safe strategies when using such products.

1.2.1.15 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of rodenticides, and implementing more ecologically safe strategies when using such products.

1.2.1.16 Create incentives (non-monetary and/or monetary) within State regulations (mitigations requirements or credit, BMP satisfaction, etc.) to promote the use of retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.17 Develop a public-relations oriented certification program for private retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.18 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and land managers to control and reduce the impacts of invasive, native and non-native species in order to increase structural habitat diversity.

1.2.1.19 Create incentives for federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to farmers, woodland landowners, and private landowners to adopt and/or endorse consistent BMPs concerning controlled burns to maintain and/or improve wildlife habitat.

1.2.1.20 Coordinate across government agencies and non-government organizations to create or expand upon tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMP's.

1.2.1.21 Create and/or support market-based programs that subsidize or create branding for products derived sustainably from managed wildlife habitats.

1.2.1.22 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to horse/livestock farm owners and managers to increase structural habitat diversity in and around the farms by managing vegetation for a variety of species, in particular, farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

1.2.1.23 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to provide cost shares and/or plan approvals for management based on management approaches and prescriptions.

1.2.1.24 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners, with habitat of suitable patch size to support breeding grassland-dependent species, to alter the timing of vegetation management to benefit grassland and pollinator species.

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

1.2.1.28 Create incentives to implement dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

2 Direct Management of Natural Resources

2.3 Fire management

2.3.2 Fuel reduction

2.3.2.1 Prevent wildfires by reducing natural fuel (e.g., leaf litter).

2.3.3 Prescribed burning

2.3.3.1 Evaluate different management techniques of prescribed burns that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

2.3.3.2 Conduct prescribed burning in Northern New Jersey forests to maintain and regenerate a mosaic of upland forest habitats.

2.3.3.3 Conduct prescribed burning to improve wildlife habitat.

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.1 Control invasive insect infestations by implementing BMP strategies through biological, chemical and/or mechanical means that will depress, or when appropriate, eradicate populations in a manner that avoids excessive harm to non-target species using BMPs to control infestations and limit their spread based on an inventory of invasive insect distribution and response to outbreaks.

2.8.0.2 Develop, implement, monitor and evaluate pest control/management strategies to reduce the impacts of over-abundant wildlife species (native and/or native, invasive species) on native vegetation and the degradation of habitats supporting SGCN. Over-abundant wildlife species include but are not limited to mute swans, Canada geese, beaver and white-tailed deer.

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.5 Implement biologically safe and appropriate control/management strategies, and where appropriate, eradication strategies to reduce the impacts and/or limit the distribution of invasive and/or non-native plant species within or near aquatic systems using methods that will provide the most protection to the aquatic and riparian ecological system, and minimize disturbance to the soil and wildlife. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.8.0.6 Implement long-term management of invasive and/or non-native plants to help maintain functioning ecological systems and biological diversity, and to enhance travel corridors. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.2 Improve the availability of prey/food resources through terrestrial and aquatic plantings and habitat restoration for SGCN populations, in particular for those populations thought to be limited due wholly or in part to a lack of (or contaminated) food resources, and for migratory species (birds, bats, invertebrates).

2.10.0.3 Restore and/or enhance habitats to benefit urban-associated SGCN.

2.10.0.4 Restore and/or enhance suitable travel corridors connecting conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.8 Protect significant natural and/or unique communities by implementing best management practices when conducting habitat restoration strategies.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.10 Minimize the loss of important habitats (e.g., coastal scrub-shrub and grassy habitats, high and low marsh habitats, etc.) that provide nesting, migrating, and wintering areas for SGCN birds and other coastal and marsh-dependent species through habitat restoration efforts.

2.10.0.11 Restore and/or enhance critical migratory terrestrial and aquatic habitats (e.g., beach, grasslands, forest, scrub-shrub, etc.) for songbirds, raptors, shorebirds, waterfowl, bats and invertebrates through habitat restoration efforts and expand habitat restoration to adjacent private lands to increase the effective size of the habitat.

2.10.0.12 Create and/or maintain scrub-shrub habitats through revegetation efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.15 Restore and/or enhance terrestrial and aquatic habitats proximate to but not adjacent to roads and other transportation corridors for terrestrial-bound SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.10.0.21 Restore and/or enhance understory habitats that suppress invasive species and provide critical resources and enhance sheltering, foraging, and nesting cover for wildlife.

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.11.0.3 Create suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats through vegetation management.

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through vegetation management.

2.11.0.6 Reclaim degraded rare species habitats by conducting vegetation management needed to restore habitat value for the documented/target SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.23 Implement appropriate habitat management actions in areas where natural disturbances, such as wildfire, have been precluded.

2.11.0.24 Conduct vegetation management adjacent to aquatic habitats following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.25 Conduct vegetation management along access roads following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.26 Conduct vegetation management along roadsides and medians, avoiding peak activity periods for wildlife, that enhances wildlife dispersal naturally and safely across roads and similar barriers to/between terrestrial and/or aquatic habitats.

2.11.0.27 Conduct vegetation management for target shrub- or young forest-dependent SGCN following BMPs to minimize the risk of the establishment of invasive and non-native plants.

2.11.0.28 Conduct vegetation management in agricultural areas following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.29 Conduct vegetation management on transportation and service corridors (i.e., rights-of-way) following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.30 Identify and prioritize areas where various management tools (such as increasing salinity through the management of water levels or chemical applications) may be effective in reducing phragmites within and restoring marsh habitat.

2.11.0.31 In areas where vegetative communities are shifting due to fire suppression and controlled burns are not feasible, manage vegetation to improve wildlife habitat.

2.11.0.32 Increase structural habitat diversity around and when feasible, within agricultural landscapes by managing vegetation for a variety of species, in particular, those farms that have removed scrub-shrub habitat and/or fragmented forests, and by implementing ecologically best practices (e.g., no-till farming, maintaining hedgerows, buffer set-asides, etc.).

2.11.0.33 Increase structural habitat diversity by implementing long-term vegetation management to minimize the potential for the establishment of invasive and/or non-native plants that may outcompete native vegetation.

2.11.0.34 Increase structural habitat diversity by managing residential, commercial and recreational areas' landscapes for a variety of species. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.

2.11.0.38 Increase structural habitat diversity in and around horse/livestock farms by managing vegetation for a variety of species, in particular, in and around farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

2.11.0.39 Increase structural habitat diversity in and around solar farms by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.40 Increase structural habitat diversity surrounding areas used for energy, mining, and transportation and service corridors by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides, and avoid managing habitat during the breeding seasons for ground-nesting birds, reptiles, amphibians and small mammals.

2.11.0.41 Increase structural habitat diversity through the implementation of a variety of vegetation management practices such a prescribed burns (either increasing or decreasing their frequency depending on the site and objective), plantings, etc. that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.42 Increase structural habitat diversity within wind farms for terrestrial bound and low-flying species and around wind farms for other wildlife by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.43 Manage forests to increase variation in age structure and composition using BMPs that promote and maintain functioning ecological forest-based systems and biological diversity.

2.11.0.45 Regularly and/or rotationally create young forest habitat in targeted areas to maintain and regenerate a mosaic of upland forest habitats that will benefit shrub- and young forest-dependent species.

2.14 Wildlife disease management

2.14.0 Wildlife disease strategy development and investigation

2.14.0.1 Investigate diseases/pathogens impacting SGCN and/or their habitats.

2.14.0.2 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

2.14.0.3 Protect SGCN from exotic pathogen introduction or incident through implementation of a "rapid response plan"; DFW to give priority attention to these species in planning and/or implementing a response.

2.14.0.4 Conduct long-term monitoring of diseases in vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts.

2.14.0.5 Assess the impacts of diseases on the life cycles of wildlife.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.6 Conduct long-term studies on resident and migratory SGCN to determine if there are changes to the populations' demography (productivity, survival, dispersal) and/or to their critical and/or supporting habitats (i.e., diminishing in value, acreage or connectivity, etc.), in particular changes that would not maintain SGCN at viable levels for species populations. Update data and GIS maps; provide updated information to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.14 Identify areas with invasive, aquatic plants and animals and collect a detailed baseline assessment of the species' status and distribution. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort. Researchers and contractors performing Forest Stewardship Inventories and/or Plans on state lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.0.0.15 Conduct long-term monitoring of areas identified as having invasive, aquatic plants and animals to track the species' status/progress over time with or without the implementation of management strategies. Areas without management strategies should be assessed and prioritized for management/control. Areas where management strategies are being implemented should include an assessment of the management effort and identify/recommend and implement necessary changes to improve its success. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort.

3.0.0.26 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species including objectives and guidance pertaining to and the condition/status of critical and supporting habitats.

3.0.0.27 Evaluate the effectiveness of strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals through research and monitoring. Develop and provide NJ DEP and other appropriate governing agencies/commissions a summary of findings and recommendations to improve such efforts.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.7 Track (via a database that includes a GIS component) and research problematic species and diseases to determine their distribution, impacts on SGCN wildlife/wildlife communities, and develop potential control measures.

3.2.0.8 Implement and conduct long-term monitoring of control measures aimed at minimizing the impacts of problematic species and/or diseases to evaluate the effectiveness of such efforts and to identify and incorporate additional strategies as appropriate.

3.2.0.18 Conduct baseline surveys/inventories to better understand the distribution of fish and invertebrate (including freshwater mussels) populations.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.2 Age, size and sex structure

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.3 Baseline inventory

3.2.3.9 Investigate hazardous environmental issues that may impact grassland invertebrates.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.6 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) that could, through revegetation and/or enhancement efforts, become suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN.

3.3.1.7 Map and prioritize existing and potential areas for early succession forest management. Share the results with state, county and municipal planners.

3.3.1.9 Inventory forests throughout northern New Jersey to develop a baseline characterization of the structure and composition of habitats and identify deficient forest habitat types.

3.3.1.10 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and document fish SGCN habitats by plotting their distributions in GIS and submitting the data to the State for integration into the DEP's Biotics database.

3.3.1.16 Gather "best information" for spatial modeling and update/create a current model/depiction of anticipated habitat shifts from sea-level rise, flooding, etc.

3.3.1.17 Identify and map undeveloped roads and trails in all conserved forests, and create a database of locations. Integrate information regarding potentially sensitive areas.

3.3.1.18 Conduct an assessment using available data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels.

3.3.1.19 Identify and codify legal ORV access areas on state (and if appropriate, other conserved) lands. Provide GIS mapping to the landowner for potential use in directing such recreational activities.

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.2 Monitoring

3.3.2.1 Evaluate the effectiveness of forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.9 Investigate the effectiveness of various silviculture techniques for enhancing forests for forest-dependent SGCN.

3.3.2.10 Evaluate the efficacy and success of different management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.3.2.15 Investigate the effectiveness of management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.3.2.20 Once a system is developed for reporting and qualifying new locations of invasive species, develop, implement and monitor/evaluate invasive species removal strategies at identified locations. Priority should be given to those areas critical to SGCN and/or contain unique and/or rare plant communities supporting SGCN and/or other fish/wildlife species.

3.3.2.24 Conduct regular inventories of forests throughout northern New Jersey to characterize the changing structure and composition of habitats and monitor forest conditions.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.3 Develop/improve management techniques that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.9 Develop strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.3.16 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.3.21 Develop management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.24 Based on research, modify management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.5 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

3.5.4.6 Investigate the feasibility of mitigating for the impacts of contaminants to vulnerable wildlife, particularly SGCN. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.5.4.14 Develop and implement agreements, and update existing agreements, with government agencies regarding the protection of critical SGCN habitats (e.g., significant breeding populations of beach nesting birds, colonial waterbird nesting areas, bat colonies, etc.).

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.18 Investigate the effectiveness of survey techniques through selected “ground truthing” and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

3.5.4.21 Develop BMPs to address problematic species and diseases of unknown origin.

4 Education

4.1 Educator/Instructor training

4.1.0 Public education

4.1.0.1 Provide educational resources and training programs to private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

5 Facilities and Areas

5.15 Wildlife Management Areas

5.15.6 Roads

5.15.6.1 Clearly post areas/roads where vehicle access is permitted.

5.15.6.2 Clearly post areas/trails where vehicle access is not permitted.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.3 Secure and protect riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.7 Secure and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.3 Increase the protection of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through conservation area designations.

7 Law Enforcement

7.1 Law enforcement

7.1.3 Sub-national Level

7.1.3.2 Increase the number of law enforcement officers tending to wildlife issues to a reasonable number to sufficiently cover the State and marine waters.

7.1.4 Scale Unspecified

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.15 Implement policies that preserve and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

7.1.4.26 Educate law enforcement personnel that there may be unauthorized research projects taking place and to encourage them to investigate any activities that appear to be harmful to wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.2 Develop a team of personnel from government entities, conservation organizations and other stakeholders engaged in oil/gas spill response for marine and freshwater habitats to develop a feasible plan for oil spill response and/or to amend NJ's current oil spill response plan that clearly outlines each organizations responsibilities and an assessment and location list of available equipment for boom deployment during oil spills.

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.1.0.4 Engage government agencies, conservation partners and other stakeholders in constructive dialogues encouraging them to influence policy change and the creation of incentives through a habitat bill and/or municipal ordinances for backyard habitat.

8.1.0.15 Engage government agencies, conservation partners and other stakeholders in discussions encouraging and supporting the creation of laws and policies requiring vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

8.1.0.16 Engage local governments in discussions regarding the importance of them adopting/passing ordinances which require assessing and addressing secondary impacts (i.e., ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

8.1.0.17 Engage municipalities in constructive dialogue to identify and minimize destruction of areas prioritized for early succession forest management.

8.1.0.18 Engage NJDOT, NJ Transit Authority and other road management entities, wildlife conservation organizations/agencies (e.g., Division of Fish and Wildlife, New Jersey Conservation Foundation, Conserve Wildlife Foundation of NJ), and communities and citizens in discussions regarding the importance of and methods to enhance habitat connectivity, and work together to develop feasible strategies for ensuring that wildlife can disperse naturally and safely across roads and similar barriers to terrestrial and/or aquatic habitats.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.20 Organize a small focal group of government and non-government agencies/organizations responsible for decisions regarding beach/dune management to share and coordinate their goals so that comprehensive planning can attempt to meet all needs.

8.1.0.21 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation human-subsidized and/or overabundant, native species cause to local nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.22 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation invasive species cause to native nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.26 Coordinate across federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to woodland landowners to adopt or endorse consistent best management practices concerning controlled burns to maintain and/or improve forested habitat for wildlife.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.34 Work with the NJ Education Association and Department of Education to design curriculum and outdoor experimental learning opportunities, and provide training to teachers on implementation of these activities.

8.1.0.37 Enlist landowners and NJ citizens in the protection of and survey efforts for SGCN, in particular rare species, by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management and wildlife-related volunteer programs.

8.1.0.38 Engage partners, stakeholders and land managers in constructive dialogue promoting forest stewardship for SGCN that use core forests and forested corridors.

8.1.0.40 Encourage researchers, land managers, naturalists and enthusiasts to follow proper procedures for the coordination and/or permitting of research/management activities involving wildlife and sensitive habitats, and discourage activities that alter vegetation or wetlands, or cause harm or disturbance to wildlife.

8.1.0.42 Engage citizens, wildlife observers and photographers through discussions and distributable information regarding the importance of and encouraging implementing responsible and ethical behavior when observing wildlife by developing an alliance of wildlife photographers and widely circulating recommendations on how to reduce impact.

8.1.0.44 Engage conservation partners, stakeholders, government agencies and other land stewards in constructive dialogues encouraging their inclusion of controlled burns in forest and other stewardship plans.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.1.0.48 Form cooperative partnerships with transportation and shipment agencies and companies to facilitate habitat creation and enhancement away from and outside of project areas and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.2 Recruitment and retention activities

8.2.3 For wildlife watching

8.2.3.1 Develop and implement nature-focused tourism opportunities including wildlife viewing sites, interpretive signage highlighting unique ecosystems/habitats, and wildlife-related recreational opportunities that do not negatively impact SGCN or their habitats.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.7 Develop and provide (or otherwise make publicly available) educational programs and/or materials that describe the negative impacts of off-road vehicles and watercraft use in and adjacent to critical SGCN habitats, and the importance of confining such activities to more appropriate locations and/or seasons.

8.3.0.8 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate recreationists and encourage landowners to eliminate garbage in the vicinity of suitable wildlife habitat, in particular SGCN habitat. Information should include the detrimental impacts garbage may have on various wildlife species.

8.3.0.9 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners and land managers to include only native plants in landscaping and restoration projects. Provide information to assist them in detecting problematic establishment of invasive, non-indigenous plants.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.11 Develop and provide (or otherwise make publicly available) educational programs and/or materials to the public, wildlife-related professionals, foresters, etc., that describe the value of species that are often feared (e.g., snakes, bats, spiders, Allegheny woodrat) and/or deemed a "nuisance" (e.g., squirrel, deer, snapping turtle), and therefore, persecuted by people. Include information on tolerance, proper identification, eviction from human dwellings, how to minimize the animal's presence on the property, and/or how to live in harmony with the animal.

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.24 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

8.3.0.25 Develop educational outreach programs for landowners, nurseries and the general public regarding the negative impacts of invasive and non-native plants on our natural communities.

8.3.0.26 Develop educational outreach programs for private and public landowners and land managers regarding the importance of and how to manage core forests and forested corridors in a way that will be beneficial for SGCN, particularly endangered, threatened and special concern species.

8.3.0.27 Develop educational outreach programs for public and private landowners and land managers regarding the importance of structural habitat diversity, methods to increase diversity, and/or incentive programs available to increase habitat diversity.

8.3.0.30 Develop educational outreach programs for private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.5 Develop a plan that directs the creation or expansion of energy or utility rights-of-way in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.6 Develop a plan that directs the creation or expansion of roads and railroads or the re-establishment of abandoned railroads within and adjacent to critical forested habitats in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.8 Develop a plan that focuses on strategies for oil pipelines to avoid sensitive habitats that would be highly impacted by oil spills.

9.1.0.9 Develop a plan that focuses on strategies to minimize the creation of renewable energy farms (e.g., solar, wind) and related infrastructures within and their impacts on forested habitats and the wildlife community.

9.1.0.10 Develop a plan that focuses on strategies to minimize the impacts of mining on critical forested habitats.

9.1.0.11 Develop a plan that focuses on strategies to minimize the impacts of power plants on critical forested habitats and the wildlife community.

9.1.0.13 Develop a plan to minimize agriculture that would result in groundwater withdrawal in critical forested areas.

9.1.0.15 Develop a plan to minimize fragmentation of terrestrial and aquatic habitats by roads.

9.1.0.16 Develop a plan to minimize new lawnscapes and preserve natural vegetation within and adjacent to critical forest areas.

9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.2 Organizational strategic and CMS planning

9.2.1 Organizational strategic and operational planning

9.2.1.1 Identify and codify legal ORV access areas on state lands.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.5 Develop response plans to address disease outbreaks within wildlife populations, in particular SGCN.

9.3.1.7 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.10 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.15 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.1.16 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3 Habitat management planning

9.3.3.5 Develop a management plan using forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

9.3.3.7 Develop a management plan to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

9.3.3.8 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.3.13 Develop a management plan that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas and prevents or ameliorates near-term impacts of climate change throughout the State, but in particular within the coastal and Delaware Bay areas.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.16 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.21 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.3.28 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.3.29 Develop habitat management plans aimed at reducing or eliminating negative impacts of ORVs.

9.3.3.32 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3.34 Include controlled burn prescriptions in forest and stewardship plans to improve wildlife habitat.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.12 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed solar farm projects to reduce habitat fragmentation and minimize impacts on wildlife.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.2 Provide technical support to public and private landowners and land managers for controlling invasive, native and non-native plant species in order to increase structural habitat diversity.

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.7 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on the importance of maintaining habitat connectivity, minimizing fragmentation, and the use of CHANJ products to help them target areas for such planning.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.11 Provide educational resources, training programs, and on-the-ground guidance to private and public landowners and land managers on the benefits of and for creating young forest and early succession habitat for SGCN.

11.2.0.15 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and landowners about the importance of retaining and in an effort to protect, create, enhance and/or restore vegetation along aquatic habitats.

11.2.0.17 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of vernal pools and the protection, enhancement and/or restoration of biologically appropriate buffers.

11.2.0.22 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

11.2.0.23 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to SGCN habitats to promote the protection and/or enhancement of those adjacent habitats to increase the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and that connect conserved SGCN habitats.

11.2.0.24 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers on how to manage vegetated roadside areas (e.g., mowing, brush-hogging, etc.) on a schedule that avoids peak activity periods for wildlife and therefore, minimizes harm.

11.2.0.25 Provide educational resources, training programs, and on-the-ground guidance to resource managers regarding the assessment of and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) related to residential and commercial development.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.1 Engage partners and stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.3 Provide educational resources, training programs, and on-the-ground guidance to DOD to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop and implement forest management and other practices that minimize disturbances to SGCN (i.e., beyond their federal requirements).

11.2.1.5 Provide educational resources, training programs, and on-the-ground guidance to municipalities, state and federal agency resource managers on tasks such as writing and integrating Beach Management Plans into other management documents.

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

11.2.2 With private landowners

11.2.2.1 Provide technical support to farming operations and woodland landowners on ways to decrease clean farming (edge-to-edge) practices and create ecotones to benefit bobwhite and other species dependent on early successional habitat.

100 Law and Policy

100. Legislation

100.1.3 Sub-national Level

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.4 County and Local

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.3 Expand the acreages and enhance the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN through local ordinances.

100.1.4.14 Adopt/pass local ordinances which require assessing and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100.1.5.5 Develop legislation to provide financial support for the New Jersey Invasive Species Strike Team.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.5 Develop policies that will promote improved and secure habitat connections between conserved SGCN habitats.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.12 Develop policies that promote the preservation and protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.23 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.31 Create or expand tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMPs.

100.3.0.32 Coordinate regulations across agencies to maximize availability of and enrollment in existing Forestry Stewardship Programs (e.g., "Woodland Stewards", Farm Bill, partners, etc.) to maintain and/or improve forest habitat.

100.3.0.38 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.3.0.39 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.3.0.40 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.45 Increase the controlled burn season to focus on restoring vegetative communities.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.48 Propose new State law or regulation mandating that a State-level "development impact fee" be assessed on all new development approved by municipalities (via the Municipal Land Use Law processes), and dedicate such monies to the development and implementation of regional Habitat Conservation Plans (or existing plans/programs serving the same regional function).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.53 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded rights-of-way corridors associated with energy transport/transmission.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.63 Develop regulations that when implemented will preserve and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100.3.0.73 Develop regulations that would exempt the conversion of lawns to native vegetation (beneficial to wildlife) from local lawn ordinances.

100.3.2 State Land Acquisition Programs

100.3.2.1 Increase opportunities for habitat restoration by making any necessary policy changes to state, federal and local land acquisition programs (e.g., Green Acres, Blue Acres, etc.) to allow for acquisition within abandoned or failing bay shore communities, including mechanisms to relocate displaced people and infrastructure.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.2 Create a policy that requires the NJ DEP to incorporate scientific information regarding climate change and sea level rise (e.g., predictions, habitat management/acquisition efforts to enhance resilience to inundation) on their websites and to work with other government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

100.4.0.3 Develop policies for mandatory buffer strips on preserved farmlands and state-owned agricultural lands.

100.4.0.8 Develop a white paper addressing the impacts that existing, new or expanded rights-of-way have upon wildlife, wildlife habitats and habitat connectivity.

100.4.0.10 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.4.0.11 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.4.0.12 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.4.0.13 Develop policies for different circumstances (e.g., roadsides and medians, riparian, aquatic and terrestrial habitats) that outline appropriate habitat/vegetation management strategies and schedules to minimize risks to and benefit wildlife.

100.4.0.16 Develop policies to implement habitat management strategies that will increase the structural diversity surrounding areas used for energy, mining, and transportation and service corridors which include but are not limited to the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-

100.4.0.17 Develop policies to implement habitat management strategies, including prescribed burns, that will increase the structural diversity on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies to control and reduce the impacts of invasive, non-native species in order to increase structural habitat diversity.

100.4.0.18 Develop policies to minimize the extent of infrastructure associated with energy and service corridors or areas (e.g., wind and solar farms, pipelines, utility lines) and that require the implementation of habitat management strategies that will increase the structural diversity in the area including (e.g., the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides).

100.4.0.19 Develop regulations that will minimize the creation of new barriers, remove or replace current barriers with appropriately-sized systems to accommodate wildlife dispersal, and to minimize road widening and traffic volume increases within critical wildlife habitat areas.

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.24 Develop policies to provide financial support for the New Jersey Invasive Species Strike Team.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Pinelands Moths

Focal species that comprise this Conservation Target:

A Notodontid Moth (H. varia)	Buchholz's Dart Moth	Buchholz's Gray
Carter's Noctuid Moth	Daecke's Pyralid Moth	Pink Sallow
Sand Myrtle Looper/Pink		

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:
- 1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.1.1.2 Loss, alteration and/or degradation of habitat.
- 1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:
- 1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.2.1.2 Loss, alteration and/or degradation of habitat.
- 1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:
- 1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.3.1.2 Loss, alteration and/or degradation of habitat.
- 1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.2 Small-holder Farming (Avg. Score: 1.00)

NJ Specific Threats:
- 2.1.2.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.
- 2.1.2.2 Fragments terrestrial and aquatic habitats.

2.1.3 Agro-industry (Avg. Score: 1.00)

NJ Specific Threats: 2.1.3.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.3.2 Fragments terrestrial and aquatic habitats.

2.2 Wood and Pulp Plantations

2.2.1 Small Holder (Avg. Score: 1.00)

NJ Specific Threats: 2.2.1.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.2.2 Agro-industry Plantations (Avg. Score: 1.00)

NJ Specific Threats: 2.2.2.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

3 Energy Production and Mining

3.2 Mining and Quarrying

3.2.2 Surface Mining - Rock Quarry (and sand quarries) (Avg. Score: 1.00)

NJ Specific Threats: 3.2.2.1 Fragments terrestrial and aquatic habitats.

3.2.2.2 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

3.3 Renewable Energy

3.3.2 Solar Power (Avg. Score: 1.00)

NJ Specific Threats: 3.3.2.2 Loss, alteration and/or degradation of habitat.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads (Avg. Score: 1.00)

NJ Specific Threats: 4.2.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species, inhibiting dispersal of non-volant animals, reducing gene flow, and creating barriers to fish when service line-associated roads cross streams (e.g., bridges, culverts, fords, etc.).

4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

4.2.2 Management of rights-of-way or communication tower facilities and/or their associated access roads (Avg. Score: 1.00)

NJ Specific Threats: 4.2.2.1 Improper or poorly scheduled vegetation management can cause direct mortality to and may reduce productivity of wildlife.

5 Biological Resource Use

5.1 Hunting and Collecting Terrestrial Animals

5.1.1 Intentional Use (Avg. Score: 1.00)

NJ Specific Threats: 5.1.1.1 Illegal collection of wildlife can have detrimental impacts on populations.

5.1.3 Persecution/Control (Avg. Score: 1.00)

NJ Specific Threats: 5.1.3.1 Wanton killing of perceived dangerous and/or undesirable animals.

5.3 Logging and Wood Harvesting

5.3.1 Intentional Use (subsistence/small scale) (Avg. Score: 2.00)

NJ Specific Threats: 5.3.1.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.1.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.1.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.1.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.1.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.1.6 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices in Atlantic White Cedar stands may destroy a unique wildlife wetland habitat that is difficult, and takes time, to restore.

5.3.2 Intentional Use (large scale) (Avg. Score: 2.00)

NJ Specific Threats: 5.3.2.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.2.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.2.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.2.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.2.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.2.6 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices in Atlantic White Cedar stands may destroy a unique wildlife wetland habitat that is difficult, and takes time, to restore.

5.3.3 Unintentional effects (subsistence/small scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.3.3.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4 Unintentional effects (large scale) (Avg. Score: 2.00)

NJ Specific Threats: 5.3.4.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4.5 Lack of appropriate, sustainable forest management can lead to a decrease in forest habitat diversity, degraded habitat for many forest species, the loss of habitat for early-successional species, and/or the loss of unique habitats for species that need canopy breaks and multi-aged tree composition to fulfill various life history requirements.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized) (Avg. Score: 2.00)

NJ Specific Threats:

6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.

6.1.1.3 Increased risk of harassment that results in a change in wildlife behavior and/or direct mortality from vehicle strikes.

6.1.1.6 Off-road vehicles can be a mechanism of transference of wildlife diseases and invasive plant species if gear and apparel are not properly sanitized between sites.

7 Natural Systems Modifications

7.1 Fire and Fire Suppression

7.1.1 Increase in Fire Frequency/Intensity (Avg. Score: 3.00)

NJ Specific Threats:

7.1.1.1 Increase in frequency and intensity of wild fires as a result of droughts and heat waves drying out vegetation and litter.

7.1.1.2 Increase in frequency of wild fires as a result of illegal activities.

7.1.1.3 Unnatural fire regimes occurring as a result of military exercises.

7.1.1.4 Lack of diversity in age structure and composition of vegetation due to expansive, frequent fires.

7.1.2 Suppression of Fire Frequency/Intensity (Avg. Score: 3.00)

NJ Specific Threats:

7.1.2.1 Shift in vegetative communities as a result of suppression of natural fires.

7.1.2.2 Lack of diversity in age structure and composition of vegetation due to the suppression of fire.

7.2 Dams and Water Management/Use

7.2.5 Abstraction of Ground Water (domestic use) (Avg. Score: 1.00)

NJ Specific Threats:

7.2.5.1 Heavy withdrawal of ground water for domestic use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.6 Abstraction of Ground Water (commercial use) (Avg. Score: 1.00)

NJ Specific Threats:

7.2.6.1 Heavy withdrawal of ground water for industrial and commercial use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.7 Abstraction of Ground Water (agricultural use) (Avg. Score: 1.00)

NJ Specific Threats:

7.2.7.1 Heavy withdrawal of ground water for agricultural use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.3 Other Ecosystem Modifications

7.3.2 Inappropriate timing of mowing (Avg. Score: 1.00)

NJ Specific Threats:

7.3.2.1 Increased risk of direct mortality and/or reduced productivity of wildlife, as well as reduced use by migrating species.

7.3.4 Lack of natural disturbance patterns or ecosystem functions due to species loss (Avg. Score: 2.00)

NJ Specific Threats: 7.3.4.5 The lack of forest disturbance minimizes the diversity of herbaceous vegetation and other shrubs and trees that need a lot of sunlight to grow.

7.3.5 Poor habitat management (Avg. Score: 2.00)

NJ Specific Threats: 7.3.5.1 Improper or poorly scheduled maintenance of man-made corridors (e.g., roadsides and medians) can cause direct mortality to and may reduce productivity of wildlife.

7.3.5.3 Vegetation clearing removes terrestrial and riparian corridors for animal movement, shelter, and resting areas.

7.3.5.4 Vegetation clearing or inappropriate alteration adjacent to aquatic habitats threatens aquatic species by degrading habitat and water quality (altering temperature and dissolved oxygen, increasing siltation and desiccation, etc.).

7.3.5.5 Habitat management that alters or removes vegetation without implementing long-term management increases the risk of invasive and exotic plants establishing themselves, outcompeting native vegetation.

7.3.5.6 Habitat management, including that which occurs on public and private lands, that does not consider timing and species' behaviors can result in the direct mortality and/or alteration or loss of habitat.

7.3.5.7 Improperly planned habitat management and/or mitigation efforts along roadsides and within the medians can attract wildlife and increase the risk of vehicle strikes.

7.3.5.12 Lack of diversity in age structure and composition of vegetation due to lack of natural disturbances and/or vegetation management.

7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.1.1.1 Displace or outcompete native species for resources.

8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.

8.1.1.3 Invasive, non-native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

8.1.1.4 Invasive, non-native animals increase the risk of predation on native animals and/or herbivory on native vegetation.

8.1.1.5 Invasive, non-native animals and plants increase the risk of introduction and transference of diseases

8.1.1.6 Invasive, non-native plants may create physical barriers for some species.

8.1.4 Invasive non-native terrestrial/wetland animals (Avg. Score: 2.00)

NJ Specific Threats: 8.1.4.1 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.6 Invasive non-native fungal/bacterial diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.1.6.1 The introduction of non-native fungal and bacterial diseases threatens native populations and ecosystems.

8.2 Problematic Native Species/Diseases

8.2.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.2.1.1 Overabundant native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

8.2.1.2 Invasive pathogens and insects may increase in range and abundance as limiting factors (such as temperature) are altered as a result of climate change.

8.2.1.4 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.2.2 Named Species (Avg. Score: 1.00)

NJ Specific Threats: 8.2.2.2 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.4 Problematic Species/Diseases of Unknown Origin

8.4.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.4.1.1 Non-native or poorly understood diseases and parasites could potentially impact native animals.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.3 Agricultural and Forestry Effluents

9.3.3 Herbicides and Pesticides (Avg. Score: 3.00)

NJ Specific Threats: 9.3.3.1 Pesticides degrade terrestrial and aquatic habitats, especially streams, ponds and wetlands. Aquatic wildlife are particularly sensitive to these contaminants, which can cause developmental and behavioral abnormalities and reproductive failure. Some contaminants may bioaccumulate in predatory fish and birds and disrupt reproduction.

9.3.3.3 Use of pesticides can directly harm non-target species through direct contact and/or by reducing and/or contaminating their food supply.

9.3.3.4 Use of herbicides can destroy beneficial food and nectar plants for insects.

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture (Avg. Score: 3.00)

NJ Specific Threats: 9.3.5.1 Use of pesticides, insecticides, and/or herbicides can directly harm non-target species, such as amphibians and beneficial invertebrates through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5.2 Use of herbicides can destroy beneficial food and nectar plants for insects.

9.3.5.4 Improper use of current insecticides, such as those containing esfenvalerate, prallethrin, or piperonyl butoxide, or past use of pesticides containing chlordane still present in the soils, are toxic to various wildlife species, and can cause injury, mortality, or other effects that impair population viability.

9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.5 Air-Bourne Pollutants

9.5.4 Other (Avg. Score: 1.00)

NJ Specific Threats: 9.5.4.1 Dust and/or airborne sedimentation from construction sites, agricultural operations or related earth disturbances can introduce mineral or organic sediments into adjacent wildlife habitats, degrading their quality and suitability for wildlife short-term and/or long-term.

9.5.6 Herbicides and Pesticides (Avg. Score: 3.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 3.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.6 Phenology Shifting or Alteration

11.6.1 Phenology shifts related to pollination ecology (Avg. Score: 1.00)

NJ Specific Threats: 11.6.1.1 Alters inter-specific relationships of wildlife and vegetation, ultimately leading to detrimental impacts on the ecological system.

11.6.3 Phenology shifts related to species redistribution (Avg. Score: 1.00)

NJ Specific Threats: 11.6.3.1 Shifts in timing of species migration, breeding and hibernation, and available food resources, as a result of wildlife range shifts driven by climate change.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 3.00)

NJ Specific Threats: 12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.2 Lack of up-to-date existing information (Avg. Score: 3.00)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.3 Need to answer research question (Avg. Score: 3.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.4 Need to develop new technique (Avg. Score: 3.00)

NJ Specific Threats: 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 1.00)

NJ Specific Threats: 12.3.0.1 Regulatory habitat protections within state land use regulations are spatially limited to specific geographic areas (e.g., Pinelands, Coastal Area) or geographic features (e.g., wetlands, streams) and so fail to protect critical habitats that exist outside of these regulated areas.

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.9 Prescribed burns implemented by the NJ Forest Fire Service are constrained by State air quality regulations to a timeframe where seasonal weather conditions are less than ideal for effective burning. As a result, the Forest Fire Service is limited in the number of overall prescribed burns it can implement to restore habitat for wildlife.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 1.00)

NJ Specific Threats:

12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.

12.4.0.5 Bureau of Forest Fire Management policy has traditionally implemented prescribed burns on State lands for the sole purpose of public safety (i.e., addressing hazard fuel reduction), missing opportunities to burn in a manner that would additionally manage habitat for ecological diversity.

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 3.00)

NJ Specific Threats:

14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 3.00)

NJ Specific Threats:

14.2.1.1 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various forest management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 1.00)

NJ Specific Threats:

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.5 Secure and promote the protection/restoration of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through incentive programs.

1.2.1.6 Secure and promote the protection/restoration of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.9 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing Forestry Stewardship Programs.

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.12 Create incentives (non-monetary and/or monetary) for land developers to redevelop abandoned areas (e.g., shopping centers, office complexes) to minimize the loss of natural habitats and reduce the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.14 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of herbicides and pesticides, and implementing more ecologically safe strategies when using such products.

1.2.1.15 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of rodenticides, and implementing more ecologically safe strategies when using such products.

1.2.1.16 Create incentives (non-monetary and/or monetary) within State regulations (mitigations requirements or credit, BMP satisfaction, etc.) to promote the use of retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.17 Develop a public-relations oriented certification program for private retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.18 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and land managers to control and reduce the impacts of invasive, native and non-native species in order to increase structural habitat diversity.

1.2.1.19 Create incentives for federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to farmers, woodland landowners, and private landowners to adopt and/or endorse consistent BMPs concerning controlled burns to maintain and/or improve wildlife habitat.

1.2.1.20 Coordinate across government agencies and non-government organizations to create or expand upon tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMP's.

1.2.1.21 Create and/or support market-based programs that subsidize or create branding for products derived sustainably from managed wildlife habitats.

1.2.1.22 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to horse/livestock farm owners and managers to increase structural habitat diversity in and around the farms by managing vegetation for a variety of species, in particular, farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

1.2.1.23 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to provide cost shares and/or plan approvals for management based on management approaches and prescriptions.

1.2.1.24 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners, with habitat of suitable patch size to support breeding grassland-dependent species, to alter the timing of vegetation management to benefit grassland and pollinator species.

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

1.2.1.28 Create incentives to implement dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

2 Direct Management of Natural Resources

2.3 Fire management

2.3.2 Fuel reduction

2.3.2.1 Prevent wildfires by reducing natural fuel (e.g., leaf litter).

2.3.3 Prescribed burning

2.3.3.1 Evaluate different management techniques of prescribed burns that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

2.3.3.2 Conduct prescribed burning in Northern New Jersey forests to maintain and regenerate a mosaic of upland forest habitats.

2.3.3.3 Conduct prescribed burning to improve wildlife habitat.

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.1 Control invasive insect infestations by implementing BMP strategies through biological, chemical and/or mechanical means that will depress, or when appropriate, eradicate populations in a manner that avoids excessive harm to non-target species using BMPs to control infestations and limit their spread based on an inventory of invasive insect distribution and response to outbreaks.

2.8.0.2 Develop, implement, monitor and evaluate pest control/management strategies to reduce the impacts of over-abundant wildlife species (native and/or native, invasive species) on native vegetation and the degradation of habitats supporting SGCN. Over-abundant wildlife species include but are not limited to mute swans, Canada geese, beaver and white-tailed deer.

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.5 Implement biologically safe and appropriate control/management strategies, and where appropriate, eradication strategies to reduce the impacts and/or limit the distribution of invasive and/or non-native plant species within or near aquatic systems using methods that will provide the most protection to the aquatic and riparian ecological system, and minimize disturbance to the soil and wildlife. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.8.0.6 Implement long-term management of invasive and/or non-native plants to help maintain functioning ecological systems and biological diversity, and to enhance travel corridors. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.2 Improve the availability of prey/food resources through terrestrial and aquatic plantings and habitat restoration for SGCN populations, in particular for those populations thought to be limited due wholly or in part to a lack of (or contaminated) food resources, and for migratory species (birds, bats, invertebrates).

2.10.0.3 Restore and/or enhance habitats to benefit urban-associated SGCN.

2.10.0.4 Restore and/or enhance suitable travel corridors connecting conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.8 Protect significant natural and/or unique communities by implementing best management practices when conducting habitat restoration strategies.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.10 Minimize the loss of important habitats (e.g., coastal scrub-shrub and grassy habitats, high and low marsh habitats, etc.) that provide nesting, migrating, and wintering areas for SGCN birds and other coastal and marsh-dependent species through habitat restoration efforts.

2.10.0.11 Restore and/or enhance critical migratory terrestrial and aquatic habitats (e.g., beach, grasslands, forest, scrub-shrub, etc.) for songbirds, raptors, shorebirds, waterfowl, bats and invertebrates through habitat restoration efforts and expand habitat restoration to adjacent private lands to increase the effective size of the habitat.

2.10.0.12 Create and/or maintain scrub-shrub habitats through revegetation efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.15 Restore and/or enhance terrestrial and aquatic habitats proximate to but not adjacent to roads and other transportation corridors for terrestrial-bound SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.10.0.21 Restore and/or enhance understory habitats that suppress invasive species and provide critical resources and enhance sheltering, foraging, and nesting cover for wildlife.

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.11.0.3 Create suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats through vegetation management.

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through vegetation management.

2.11.0.6 Reclaim degraded rare species habitats by conducting vegetation management needed to restore habitat value for the documented/target SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.23 Implement appropriate habitat management actions in areas where natural disturbances, such as wildfire, have been precluded.

2.11.0.24 Conduct vegetation management adjacent to aquatic habitats following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.25 Conduct vegetation management along access roads following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.26 Conduct vegetation management along roadsides and medians, avoiding peak activity periods for wildlife, that enhances wildlife dispersal naturally and safely across roads and similar barriers to/between terrestrial and/or aquatic habitats.

2.11.0.27 Conduct vegetation management for target shrub- or young forest-dependent SGCN following BMPs to minimize the risk of the establishment of invasive and non-native plants.

2.11.0.28 Conduct vegetation management in agricultural areas following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.29 Conduct vegetation management on transportation and service corridors (i.e., rights-of-way) following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.30 Identify and prioritize areas where various management tools (such as increasing salinity through the management of water levels or chemical applications) may be effective in reducing phragmites within and restoring marsh habitat.

2.11.0.31 In areas where vegetative communities are shifting due to fire suppression and controlled burns are not feasible, manage vegetation to improve wildlife habitat.

2.11.0.32 Increase structural habitat diversity around and when feasible, within agricultural landscapes by managing vegetation for a variety of species, in particular, those farms that have removed scrub-shrub habitat and/or fragmented forests, and by implementing ecologically best practices (e.g., no-till farming, maintaining hedgerows, buffer set-asides, etc.).

2.11.0.33 Increase structural habitat diversity by implementing long-term vegetation management to minimize the potential for the establishment of invasive and/or non-native plants that may outcompete native vegetation.

2.11.0.34 Increase structural habitat diversity by managing residential, commercial and recreational areas' landscapes for a variety of species. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.

2.11.0.38 Increase structural habitat diversity in and around horse/livestock farms by managing vegetation for a variety of species, in particular, in and around farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

2.11.0.39 Increase structural habitat diversity in and around solar farms by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.40 Increase structural habitat diversity surrounding areas used for energy, mining, and transportation and service corridors by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides, and avoid managing habitat during the breeding seasons for ground-nesting birds, reptiles, amphibians and small mammals.

2.11.0.41 Increase structural habitat diversity through the implementation of a variety of vegetation management practices such a prescribed burns (either increasing or decreasing their frequency depending on the site and objective), plantings, etc. that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.42 Increase structural habitat diversity within wind farms for terrestrial bound and low-flying species and around wind farms for other wildlife by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.43 Manage forests to increase variation in age structure and composition using BMPs that promote and maintain functioning ecological forest-based systems and biological diversity.

2.11.0.45 Regularly and/or rotationally create young forest habitat in targeted areas to maintain and regenerate a mosaic of upland forest habitats that will benefit shrub- and young forest-dependent species.

2.14 Wildlife disease management

2.14.0 Wildlife disease strategy development and investigation

2.14.0.1 Investigate diseases/pathogens impacting SGCN and/or their habitats.

2.14.0.2 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

2.14.0.3 Protect SGCN from exotic pathogen introduction or incident through implementation of a "rapid response plan"; DFW to give priority attention to these species in planning and/or implementing a response.

2.14.0.4 Conduct long-term monitoring of diseases in vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts.

2.14.0.5 Assess the impacts of diseases on the life cycles of wildlife.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.6 Conduct long-term studies on resident and migratory SGCN to determine if there are changes to the populations' demography (productivity, survival, dispersal) and/or to their critical and/or supporting habitats (i.e., diminishing in value, acreage or connectivity, etc.), in particular changes that would not maintain SGCN at viable levels for species populations. Update data and GIS maps; provide updated information to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.14 Identify areas with invasive, aquatic plants and animals and collect a detailed baseline assessment of the species' status and distribution. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort. Researchers and contractors performing Forest Stewardship Inventories and/or Plans on state lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.0.0.15 Conduct long-term monitoring of areas identified as having invasive, aquatic plants and animals to track the species' status/progress over time with or without the implementation of management strategies. Areas without management strategies should be assessed and prioritized for management/control. Areas where management strategies are being implemented should include an assessment of the management effort and identify/recommend and implement necessary changes to improve its success. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort.

3.0.0.26 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species including objectives and guidance pertaining to and the condition/status of critical and supporting habitats.

3.0.0.27 Evaluate the effectiveness of strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals through research and monitoring. Develop and provide NJ DEP and other appropriate governing agencies/commissions a summary of findings and recommendations to improve such efforts.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.7 Track (via a database that includes a GIS component) and research problematic species and diseases to determine their distribution, impacts on SGCN wildlife/wildlife communities, and develop potential control measures.

3.2.0.8 Implement and conduct long-term monitoring of control measures aimed at minimizing the impacts of problematic species and/or diseases to evaluate the effectiveness of such efforts and to identify and incorporate additional strategies as appropriate.

3.2.0.18 Conduct baseline surveys/inventories to better understand the distribution of fish and invertebrate (including freshwater mussels) populations.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.2 Age, size and sex structure

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.3 Baseline inventory

3.2.3.9 Investigate hazardous environmental issues that may impact grassland invertebrates.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.6 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) that could, through revegetation and/or enhancement efforts, become suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN.

3.3.1.7 Map and prioritize existing and potential areas for early succession forest management. Share the results with state, county and municipal planners.

3.3.1.8 Assess the availability and suitability of forest habitats for SGCN species (particularly reptiles and amphibians, birds, pollinators, and tiger beetles) in southern forests since Superstorm Sandy.

3.3.1.10 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and document fish SGCN habitats by plotting their distributions in GIS and submitting the data to the State for integration into the DEP's Biotics database.

3.3.1.16 Gather "best information" for spatial modeling and update/create a current model/depiction of anticipated habitat shifts from sea-level rise, flooding, etc.

3.3.1.17 Identify and map undeveloped roads and trails in all conserved forests, and create a database of locations. Integrate information regarding potentially sensitive areas.

3.3.1.18 Conduct an assessment using available data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels.

3.3.1.19 Identify and codify legal ORV access areas on state (and if appropriate, other conserved) lands. Provide GIS mapping to the landowner for potential use in directing such recreational activities.

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.2 Monitoring

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.8 Evaluate the effectiveness of current prescribed burning practices on Pinelands dependent species.

3.3.2.9 Investigate the effectiveness of various silviculture techniques for enhancing forests for forest-dependent SGCN.

3.3.2.10 Evaluate the efficacy and success of different management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.3.2.15 Investigate the effectiveness of management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.3.2.20 Once a system is developed for reporting and qualifying new locations of invasive species, develop, implement and monitor/evaluate invasive species removal strategies at identified locations. Priority should be given to those areas critical to SGCN and/or contain unique and/or rare plant communities supporting SGCN and/or other fish/wildlife species.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.3 Develop/improve management techniques that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.9 Develop strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.3.16 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.3.19 Work with foresters to develop prescribed burning practices for Pinelands dependent species that increase or maintain habitat quality for these species in the Pinelands.

3.5.3.21 Develop management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.24 Based on research, modify management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.5 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

3.5.4.6 Investigate the feasibility of mitigating for the impacts of contaminants to vulnerable wildlife, particularly SGCN. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.5.4.14 Develop and implement agreements, and update existing agreements, with government agencies regarding the protection of critical SGCN habitats (e.g., significant breeding populations of beach nesting birds, colonial waterbird nesting areas, bat colonies, etc.).

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.18 Investigate the effectiveness of survey techniques through selected “ground truthing” and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

3.5.4.21 Develop BMPs to address problematic species and diseases of unknown origin.

4 Education

4.1 Educator/Instructor training

4.1.0 Public education

4.1.0.1 Provide educational resources and training programs to private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

5 Facilities and Areas

5.15 Wildlife Management Areas

5.15.6 Roads

5.15.6.1 Clearly post areas/roads where vehicle access is permitted.

5.15.6.2 Clearly post areas/trails where vehicle access is not permitted.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.7 Secure and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.8 Secure and protect scrub-shrub habitats for SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.8 Promote the protection of scrub-shrub habitats for SGCN through conservation area designations.

6.4 Private lands agreements

6.4.0 Private land agreement strategies

6.4.0.1 Enter into private lands agreements to expand control burns on private lands, in particular those adjacent to conserved lands to improve SGCN habitats.

7 Law Enforcement

7.1 Law enforcement

7.1.3 Sub-national Level

7.1.3.2 Increase the number of law enforcement officers tending to wildlife issues to a reasonable number to sufficiently cover the State and marine waters.

7.1.4 Scale Unspecified

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.19 Implement policies that protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

7.1.4.26 Educate law enforcement personnel that there may be unauthorized research projects taking place and to encourage them to investigate any activities that appear to be harmful to wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.2 Develop a team of personnel from government entities, conservation organizations and other stakeholders engaged in oil/gas spill response for marine and freshwater habitats to develop a feasible plan for oil spill response and/or to amend NJ's current oil spill response plan that clearly outlines each organizations responsibilities and an assessment and location list of available equipment for boom deployment during oil spills.

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.1.0.4 Engage government agencies, conservation partners and other stakeholders in constructive dialogues encouraging them to influence policy change and the creation of incentives through a habitat bill and/or municipal ordinances for backyard habitat.

8.1.0.15 Engage government agencies, conservation partners and other stakeholders in discussions encouraging and supporting the creation of laws and policies requiring vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

8.1.0.16 Engage local governments in discussions regarding the importance of them adopting/passing ordinances which require assessing and addressing secondary impacts (i.e., ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

8.1.0.17 Engage municipalities in constructive dialogue to identify and minimize destruction of areas prioritized for early succession forest management.

8.1.0.18 Engage NJDOT, NJ Transit Authority and other road management entities, wildlife conservation organizations/agencies (e.g., Division of Fish and Wildlife, New Jersey Conservation Foundation, Conserve Wildlife Foundation of NJ), and communities and citizens in discussions regarding the importance of and methods to enhance habitat connectivity, and work together to develop feasible strategies for ensuring that wildlife can disperse naturally and safely across roads and similar barriers to terrestrial and/or aquatic habitats.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.20 Organize a small focal group of government and non-government agencies/organizations responsible for decisions regarding beach/dune management to share and coordinate their goals so that comprehensive planning can attempt to meet all needs.

8.1.0.21 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation human-subsidized and/or overabundant, native species cause to local nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.22 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation invasive species cause to native nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.26 Coordinate across federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to woodland landowners to adopt or endorse consistent best management practices concerning controlled burns to maintain and/or improve forested habitat for wildlife.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.34 Work with the NJ Education Association and Department of Education to design curriculum and outdoor experimental learning opportunities, and provide training to teachers on implementation of these activities.

8.1.0.37 Enlist landowners and NJ citizens in the protection of and survey efforts for SGCN, in particular rare species, by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management and wildlife-related volunteer programs.

8.1.0.38 Engage partners, stakeholders and land managers in constructive dialogue promoting forest stewardship for SGCN that use core forests and forested corridors.

8.1.0.40 Encourage researchers, land managers, naturalists and enthusiasts to follow proper procedures for the coordination and/or permitting of research/management activities involving wildlife and sensitive habitats, and discourage activities that alter vegetation or wetlands, or cause harm or disturbance to wildlife.

8.1.0.42 Engage citizens, wildlife observers and photographers through discussions and distributable information regarding the importance of and encouraging implementing responsible and ethical behavior when observing wildlife by developing an alliance of wildlife photographers and widely circulating recommendations on how to reduce impact.

8.1.0.44 Engage conservation partners, stakeholders, government agencies and other land stewards in constructive dialogues encouraging their inclusion of controlled burns in forest and other stewardship plans.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.1.0.48 Form cooperative partnerships with transportation and shipment agencies and companies to facilitate habitat creation and enhancement away from and outside of project areas and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.2 Recruitment and retention activities

8.2.3 For wildlife watching

8.2.3.1 Develop and implement nature-focused tourism opportunities including wildlife viewing sites, interpretive signage highlighting unique ecosystems/habitats, and wildlife-related recreational opportunities that do not negatively impact SGCN or their habitats.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.7 Develop and provide (or otherwise make publicly available) educational programs and/or materials that describe the negative impacts of off-road vehicles and watercraft use in and adjacent to critical SGCN habitats, and the importance of confining such activities to more appropriate locations and/or seasons.

8.3.0.8 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate recreationists and encourage landowners to eliminate garbage in the vicinity of suitable wildlife habitat, in particular SGCN habitat. Information should include the detrimental impacts garbage may have on various wildlife species.

8.3.0.9 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners and land managers to include only native plants in landscaping and restoration projects. Provide information to assist them in detecting problematic establishment of invasive, non-indigenous plants.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.11 Develop and provide (or otherwise make publicly available) educational programs and/or materials to the public, wildlife-related professionals, foresters, etc., that describe the value of species that are often feared (e.g., snakes, bats, spiders, Allegheny woodrat) and/or deemed a "nuisance" (e.g., squirrel, deer, snapping turtle), and therefore, persecuted by people. Include information on tolerance, proper identification, eviction from human dwellings, how to minimize the animal's presence on the property, and/or how to live in harmony with the animal.

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.24 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

8.3.0.25 Develop educational outreach programs for landowners, nurseries and the general public regarding the negative impacts of invasive and non-native plants on our natural communities.

8.3.0.26 Develop educational outreach programs for private and public landowners and land managers regarding the importance of and how to manage core forests and forested corridors in a way that will be beneficial for SGCN, particularly endangered, threatened and special concern species.

8.3.0.27 Develop educational outreach programs for public and private landowners and land managers regarding the importance of structural habitat diversity, methods to increase diversity, and/or incentive programs available to increase habitat diversity.

8.3.0.30 Develop educational outreach programs for private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.5 Develop a plan that directs the creation or expansion of energy or utility rights-of-way in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.6 Develop a plan that directs the creation or expansion of roads and railroads or the re-establishment of abandoned railroads within and adjacent to critical forested habitats in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.8 Develop a plan that focuses on strategies for oil pipelines to avoid sensitive habitats that would be highly impacted by oil spills.

9.1.0.9 Develop a plan that focuses on strategies to minimize the creation of renewable energy farms (e.g., solar, wind) and related infrastructures within and their impacts on forested habitats and the wildlife community.

9.1.0.10 Develop a plan that focuses on strategies to minimize the impacts of mining on critical forested habitats.

9.1.0.11 Develop a plan that focuses on strategies to minimize the impacts of power plants on critical forested habitats and the wildlife community.

9.1.0.13 Develop a plan to minimize agriculture that would result in groundwater withdrawal in critical forested areas.

9.1.0.15 Develop a plan to minimize fragmentation of terrestrial and aquatic habitats by roads.

9.1.0.16 Develop a plan to minimize new lawnscapes and preserve natural vegetation within and adjacent to critical forest areas.

9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

9.1.0.21 Develop a plan to minimize the use of any-sized dam in critical forested areas.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.2 Organizational strategic and CMS planning

9.2.1 Organizational strategic and operational planning

9.2.1.1 Identify and codify legal ORV access areas on state lands.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.5 Develop response plans to address disease outbreaks within wildlife populations, in particular SGCN.

9.3.1.7 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.10 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.15 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.1.16 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3 Habitat management planning

9.3.3.5 Develop a management plan using forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

9.3.3.7 Develop a management plan to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

9.3.3.8 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.3.13 Develop a management plan that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas and prevents or ameliorates near-term impacts of climate change throughout the State, but in particular within the coastal and Delaware Bay areas.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.16 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.3.17 Develop a management plan for prescribed burning that will benefit Pinelands dependent species and increase or maintain habitat quality for these species in the Pinelands.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.21 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.3.28 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.3.29 Develop habitat management plans aimed at reducing or eliminating negative impacts of ORVs.

9.3.3.32 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3.34 Include controlled burn prescriptions in forest and stewardship plans to improve wildlife habitat.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.12 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed solar farm projects to reduce habitat fragmentation and minimize impacts on wildlife.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.2 Provide technical support to public and private landowners and land managers for controlling invasive, native and non-native plant species in order to increase structural habitat diversity.

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.7 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on the importance of maintaining habitat connectivity, minimizing fragmentation, and the use of CHANJ products to help them target areas for such planning.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.11 Provide educational resources, training programs, and on-the-ground guidance to private and public landowners and land managers on the benefits of and for creating young forest and early succession habitat for SGCN.

11.2.0.15 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and landowners about the importance of retaining and in an effort to protect, create, enhance and/or restore vegetation along aquatic habitats.

11.2.0.17 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of vernal pools and the protection, enhancement and/or restoration of biologically appropriate buffers.

11.2.0.19 Provide educational resources and technical support to public and private landowners and land managers to promote the protection and/or enhancement of scrub-shrub habitats for SGCN.

11.2.0.22 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

11.2.0.23 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to SGCN habitats to promote the protection and/or enhancement of those adjacent habitats to increase the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and that connect conserved SGCN habitats.

11.2.0.24 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers on how to manage vegetated roadside areas (e.g., mowing, brush-hogging, etc.) on a schedule that avoids peak activity periods for wildlife and therefore, minimizes harm.

11.2.0.25 Provide educational resources, training programs, and on-the-ground guidance to resource managers regarding the assessment of and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) related to residential and commercial development.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.1 Engage partners and stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.3 Provide educational resources, training programs, and on-the-ground guidance to DOD to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop and implement forest management and other practices that minimize disturbances to SGCN (i.e., beyond their federal requirements).

11.2.1.5 Provide educational resources, training programs, and on-the-ground guidance to municipalities, state and federal agency resource managers on tasks such as writing and integrating Beach Management Plans into other management documents.

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

11.2.2 With private landowners

11.2.2.1 Provide technical support to farming operations and woodland landowners on ways to decrease clean farming (edge-to-edge) practices and create ecotones to benefit bobwhite and other species dependent on early successional habitat.

100 Law and Policy

100. Legislation

100.1.3 Sub-national Level

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.4 County and Local

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.3 Expand the acreages and enhance the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN through local ordinances.

100.1.4.14 Adopt/pass local ordinances which require assessing and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100.1.5.5 Develop legislation to provide financial support for the New Jersey Invasive Species Strike Team.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.5 Develop policies that will promote improved and secure habitat connections between conserved SGCN habitats.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.12 Develop policies that promote the preservation and protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.15 Develop policies that promote protecting and restoring scrub-shrub habitats to benefit shrub-dependent SGCN.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.23 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.31 Create or expand tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMPs.

100.3.0.32 Coordinate regulations across agencies to maximize availability of and enrollment in existing Forestry Stewardship Programs (e.g., "Woodland Stewards", Farm Bill, partners, etc.) to maintain and/or improve forest habitat.

100.3.0.38 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.3.0.39 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.3.0.40 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.45 Increase the controlled burn season to focus on restoring vegetative communities.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.48 Propose new State law or regulation mandating that a State-level "development impact fee" be assessed on all new development approved by municipalities (via the Municipal Land Use Law processes), and dedicate such monies to the development and implementation of regional Habitat Conservation Plans (or existing plans/programs serving the same regional function).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.53 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded rights-of-way corridors associated with energy transport/transmission.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.65 Develop regulations that when implemented will protect and restore scrub-shrub habitats to benefit shrub-dependent SGCN.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100.3.0.73 Develop regulations that would exempt the conversion of lawns to native vegetation (beneficial to wildlife) from local lawn ordinances.

100.3.2 State Land Acquisition Programs

100.3.2.1 Increase opportunities for habitat restoration by making any necessary policy changes to state, federal and local land acquisition programs (e.g., Green Acres, Blue Acres, etc.) to allow for acquisition within abandoned or failing bay shore communities, including mechanisms to relocate displaced people and infrastructure.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.2 Create a policy that requires the NJ DEP to incorporate scientific information regarding climate change and sea level rise (e.g., predictions, habitat management/acquisition efforts to enhance resilience to inundation) on their websites and to work with other government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

100.4.0.3 Develop policies for mandatory buffer strips on preserved farmlands and state-owned agricultural lands.

100.4.0.8 Develop a white paper addressing the impacts that existing, new or expanded rights-of-way have upon wildlife, wildlife habitats and habitat connectivity.

100.4.0.10 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.4.0.11 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.4.0.12 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.4.0.13 Develop policies for different circumstances (e.g., roadsides and medians, riparian, aquatic and terrestrial habitats) that outline appropriate habitat/vegetation management strategies and schedules to minimize risks to and benefit wildlife.

100.4.0.16 Develop policies to implement habitat management strategies that will increase the structural diversity surrounding areas used for energy, mining, and transportation and service corridors which include but are not limited to the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-

100.4.0.17 Develop policies to implement habitat management strategies, including prescribed burns, that will increase the structural diversity on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies to control and reduce the impacts of invasive, non-native species in order to increase structural habitat diversity.

100.4.0.18 Develop policies to minimize the extent of infrastructure associated with energy and service corridors or areas (e.g., wind and solar farms, pipelines, utility lines) and that require the implementation of habitat management strategies that will increase the structural diversity in the area including (e.g., the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides).

100.4.0.19 Develop regulations that will minimize the creation of new barriers, remove or replace current barriers with appropriately-sized systems to accommodate wildlife dispersal, and to minimize road widening and traffic volume increases within critical wildlife habitat areas.

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.24 Develop policies to provide financial support for the New Jersey Invasive Species Strike Team.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Pond Odonates

Focal species that comprise this Conservation Target:

New England Bluet | Pine Barrens Bluet | Scarlet Bluet

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:

- 1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.1.1.2 Loss, alteration and/or degradation of habitat.
- 1.1.1.5 Impervious surfaces can lead to a decrease in water recharge.
- 1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.
- 1.1.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:

- 1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.2.1.2 Loss, alteration and/or degradation of habitat.
- 1.2.1.5 Impervious surfaces can lead to a decrease in water recharge.
- 1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.
- 1.2.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats:

- 1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.3.1.2 Loss, alteration and/or degradation of habitat.
- 1.3.1.4 Impervious surfaces can lead to a decrease in water recharge.
- 1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.
- 1.3.1.6 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture (Avg. Score: 1.00)

NJ Specific Threats: 2.1.1.3 Conversion of agricultural landscape that results in increased erosion, runoff, and chemical and thermal pollution decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.1.2 Small-holder Farming (Avg. Score: 1.00)

NJ Specific Threats: 2.1.2.2 Fragments terrestrial and aquatic habitats.

2.1.3 Agro-industry (Avg. Score: 1.00)

NJ Specific Threats: 2.1.3.2 Fragments terrestrial and aquatic habitats.

2.3 Livestock Farming and Ranching

2.3.2 Small-holder Grazing (Avg. Score: 1.00)

NJ Specific Threats: 2.3.2.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.2.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

2.3.2.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.2.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

2.3.3 Agro-industry Grazing (Avg. Score: 1.00)

NJ Specific Threats: 2.3.3.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.3.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

2.3.3.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.3.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

3 Energy Production and Mining

3.4 Conventional Power Plants

3.4.0 Conventional Power Plants (Avg. Score: 1.00)

NJ Specific Threats: 3.4.0.3 Alteration of the temperature, pH and/or hydrology of aquatic ecosystems change plant communities and can harm wildlife and/or impact their behavior and survivorship.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads (Avg. Score: 1.00)

NJ Specific Threats: 4.2.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species, inhibiting dispersal of non-volant animals, reducing gene flow, and creating barriers to fish when service line-associated roads cross streams (e.g., bridges, culverts, fords, etc.).

4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

4.2.1.4 Lines that cross or run parallel to streams result in a loss or reduction of vegetated riparian buffers and streamside shading, affecting water quality and in-stream habitat for aquatic biota.

4.2.2 Management of rights-of-way or communication tower facilities and/or their associated access roads (Avg. Score: 1.00)

NJ Specific Threats: 4.2.2.1 Improper or poorly scheduled vegetation management can cause direct mortality to and may reduce productivity of wildlife.

5 Biological Resource Use

5.1 Hunting and Collecting Terrestrial Animals

5.1.1 Intentional Use (Avg. Score: 1.00)

NJ Specific Threats: 5.1.1.1 Illegal collection of wildlife can have detrimental impacts on populations.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized) (Avg. Score: 1.00)

NJ Specific Threats: 6.1.1.6 Off-road vehicles can be a mechanism of transference of wildlife diseases and invasive plant species if gear and apparel are not properly sanitized between sites.

7 Natural Systems Modifications

7.1 Fire and Fire Suppression

7.1.2 Suppression of Fire Frequency/Intensity (Avg. Score: 1.00)

NJ Specific Threats: 7.1.2.1 Shift in vegetative communities as a result of suppression of natural fires.

7.1.2.2 Lack of diversity in age structure and composition of vegetation due to the suppression of fire.

7.2 Dams and Water Management/Use

7.2.1 Abstraction of Surface Water (domestic use) (Avg. Score: 2.00)

NJ Specific Threats: 7.2.1.1 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.1.2 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.1.3 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, and eliminates shallow water habitats.

7.2.2 Abstraction of Surface Water (commercial use) (Avg. Score: 2.00)

NJ Specific Threats: 7.2.2.1 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, eliminates shallow water habitats, and disrupts/removes stream bottom habitat.

7.2.2.2 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.2.3 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.3 Abstraction of Surface Water (agricultural use) (Avg. Score: 2.00)

NJ Specific Threats: 7.2.3.1 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.3.2 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, and eliminates shallow water habitats.

7.2.3.3 Impounding water to create or expand bogs for cranberry farming leads to the loss of natural wetlands and the alteration of the natural hydrology in the area.

7.2.3.5 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.5 Abstraction of Ground Water (domestic use) (Avg. Score: 2.00)

NJ Specific Threats: 7.2.5.1 Heavy withdrawal of ground water for domestic use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.6 Abstraction of Ground Water (commercial use) (Avg. Score: 2.00)

NJ Specific Threats: 7.2.6.1 Heavy withdrawal of ground water for industrial and commercial use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.7 Abstraction of Ground Water (agricultural use) (Avg. Score: 2.00)

NJ Specific Threats: 7.2.7.1 Heavy withdrawal of ground water for agricultural use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.9 Small Dams (Avg. Score: 1.00)

NJ Specific Threats: 7.2.9.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.9.3 Dams act as a barrier to movement, limiting the ability of aquatic or semi-aquatic wildlife to move safely between habitats.

7.2.10 Large Dams (Avg. Score: 1.00)

NJ Specific Threats: 7.2.10.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.11 Dams (size unknown) (Avg. Score: 1.00)

NJ Specific Threats: 7.2.11.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.3 Other Ecosystem Modifications

7.3.2 Inappropriate timing of mowing (Avg. Score: 1.00)

NJ Specific Threats: 7.3.2.1 Increased risk of direct mortality and/or reduced productivity of wildlife, as well as reduced use by migrating species.

7.3.5 Poor habitat management (Avg. Score: 2.00)

NJ Specific Threats: 7.3.5.1 Improper or poorly scheduled maintenance of man-made corridors (e.g., roadsides and medians) can cause direct mortality to and may reduce productivity of wildlife.

7.3.5.3 Vegetation clearing removes terrestrial and riparian corridors for animal movement, shelter, and resting areas.

7.3.5.4 Vegetation clearing or inappropriate alteration adjacent to aquatic habitats threatens aquatic species by degrading habitat and water quality (altering temperature and dissolved oxygen, increasing siltation and desiccation, etc.).

7.3.5.5 Habitat management that alters or removes vegetation without implementing long-term management increases the risk of invasive and exotic plants establishing themselves, outcompeting native vegetation.

7.3.5.6 Habitat management, including that which occurs on public and private lands, that does not consider timing and species' behaviors can result in the direct mortality and/or alteration or loss of habitat.

7.3.5.9 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, eliminates shallow water habitats, and disrupts/removes stream bottom habitat.

7.3.5.10 Ditching, draining and filling of marshes and wetlands eliminates habitat and degrades the remaining surrounding areas for wildlife.

7.3.5.12 Lack of diversity in age structure and composition of vegetation due to lack of natural disturbances and/or vegetation management.

7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.1.1.1 Displace or outcompete native species for resources.

8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.

8.1.1.4 Invasive, non-native animals increase the risk of predation on native animals and/or herbivory on native vegetation.

8.1.1.6 Invasive, non-native plants may create physical barriers for some species.

8.1.2 Invasive non-native aquatic animals (Avg. Score: 2.00)

NJ Specific Threats: 8.1.2.2 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminishing habitat suitability and reducing ecological integrity of natural communities, and may introduce disease into a population.

8.1.3 Invasive non-native aquatic plants (Avg. Score: 2.00)

NJ Specific Threats: 8.1.3.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.4 Invasive non-native terrestrial/wetland animals (Avg. Score: 1.00)

NJ Specific Threats: 8.1.4.1 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.5 Invasive non-native terrestrial/wetland plants (Avg. Score: 2.00)

NJ Specific Threats: 8.1.5.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.6 Invasive non-native fungal/bacterial diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.1.6.1 The introduction of non-native fungal and bacterial diseases threatens native populations and ecosystems.

8.4 Problematic Species/Diseases of Unknown Origin

8.4.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.4.1.1 Non-native or poorly understood diseases and parasites could potentially impact native animals.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.1 Domestic and Urban Waste Water

9.1.1 Sewage (Avg. Score: 2.00)

NJ Specific Threats: 9.1.1.1 Degradation of aquatic and marine water quality and habitats by changing turbidity, flow and water chemistry.

9.1.1.3 Contaminants in sewage treatment effluents and Combined Sewer Overflows can cause developmental and behavioral abnormalities and reproductive failure in wildlife.

9.1.2 Run-off (Avg. Score: 2.00)

NJ Specific Threats: 9.1.2.1 Chemical fertilizers and nutrient run-off changes the pH in streams and ponds and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.1.2.2 Contaminants degrade aquatic and marine water quality and can bioaccumulate in benthic organisms, threatening wildlife by causing developmental and behavioral abnormalities and reproductive failure.

9.1.2.3 Contaminants from road runoff (oil, sediment, salt, etc.) impact native vegetation and the species that rely upon them, degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2 Industrial and Military Effluents

9.2.1 Oil Spills (Avg. Score: 1.00)

NJ Specific Threats: 9.2.1.1 Oil spills render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.1.2 Oil spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.1.3 Oil spills cause external oiling of wildlife and ingestion of oil, both of which can injure or kill wildlife.

9.2.2 Seepage from Mining (Avg. Score: 1.00)

NJ Specific Threats: 9.2.2.1 Contaminants from mining degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2.3 Other (Avg. Score: 1.00)

NJ Specific Threats: 9.2.3.1 Point and nonpoint source pollution such as polychlorinated biphenyls (PCBs), pesticides, heavy metals, and endocrine disrupting compounds (EDC's) into freshwater and marine systems pose threats to wildlife through direct contact and/or ingestion, and to aquatic species and their predators through bioaccumulation, impacting the reproductive success and neurological function of many avian and fish species.

9.2.3.2 Chemical spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.3.3 Chemical spills may render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.4 Other: Hydrofracturing (Avg. Score: 1.00)

NJ Specific Threats: 9.2.4.1 Contaminants from hydrofracturing degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2.4.2 Uncontrolled effluents escaping from hydrofracturing facilities can cause injury to wildlife and alter normal behaviors.

9.3 Agricultural and Forestry Effluents

9.3.1 Nutrient Loads (Avg. Score: 2.00)

NJ Specific Threats:

9.3.1.1 Chemical fertilizers and nutrient run-off changes the pH in streams, ponds and wetlands and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.3.1.2 Animal waste degrades terrestrial and aquatic habitats, especially streams, ponds and wetlands, resulting in eutrophication, which disrupts oxygen and nutrient balances, and causes injury and mortality to aquatic organisms.

9.3.1.4 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades wetland and aquatic habitats with runoff, increasing sediment and nutrient loads and pH.

9.3.1.5 Conversion of native forests to plantations degrades wetland and aquatic habitats through increased runoff.

9.3.2 Soil Erosion and Sedimentation (Avg. Score: 2.00)

NJ Specific Threats:

9.3.2.1 Soil erosion, sedimentation and destruction of streambanks and riparian buffers degrade waters making them unsuitable for riparian-dependent wildlife.

9.3.2.3 Conversion of native forests to plantations degrades wetland and aquatic habitats through increased sedimentation.

9.3.3 Herbicides and Pesticides (Avg. Score: 3.00)

NJ Specific Threats:

9.3.3.1 Pesticides degrade terrestrial and aquatic habitats, especially streams, ponds and wetlands. Aquatic wildlife are particularly sensitive to these contaminants, which can cause developmental and behavioral abnormalities and reproductive failure. Some contaminants may bioaccumulate in predatory fish and birds and disrupt reproduction.

9.3.3.3 Use of pesticides can directly harm non-target species through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture (Avg. Score: 3.00)

NJ Specific Threats:

9.3.5.1 Use of pesticides, insecticides, and/or herbicides can directly harm non-target species, such as amphibians and beneficial invertebrates through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5.4 Improper use of current insecticides, such as those containing esfenvalerate, prallethrin, or piperonyl butoxide, or past use of pesticides containing chlordane still present in the soils, are toxic to various wildlife species, and can cause injury, mortality, or other effects that impair population viability.

9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.5 Air-Bourne Pollutants

9.5.1 Acid Rain (Avg. Score: 1.00)

NJ Specific Threats:

9.5.1.1 Causes acidification of water bodies, resulting in changes to aquatic and marine communities and reducing biodiversity, and creating conditions that are unsuitable for some aquatic (freshwater and marine) and semi-aquatic species that are sensitive to pH shifts.

9.5.4 Other (Avg. Score: 1.00)

NJ Specific Threats:

9.5.4.1 Dust and/or airborne sedimentation from construction sites, agricultural operations or related earth disturbances can introduce mineral or organic sediments into adjacent wildlife habitats, degrading their quality and suitability for wildlife short-term and/or long-term.

9.5.6 Herbicides and Pesticides (Avg. Score: 3.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

9.6 Excess Energy

9.6.2 Thermal Pollution (Avg. Score: 1.00)

NJ Specific Threats: 9.6.2.2 Water temperature changes to aquatic systems can deter or preclude use by SGCN (e.g., alter habitat suitability for wildlife species, reduce prey base) or present stressors that are harmful if not fatal to wildlife.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 3.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.2 Droughts

11.2.1 Droughts (Avg. Score: 2.00)

NJ Specific Threats: 11.2.1.1 Contribute to hardened soils, decreasing water recharge during rains and increasing the likelihood of flash floods during storms.

11.2.1.2 Lead to lower groundwater levels and therefore, less available water for people and habitats.

11.2.1.3 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

11.3 Temperature Extremes

11.3.1 Temperature extremes (Avg. Score: 1.00)

NJ Specific Threats: 11.3.1.1 Increasing temperatures may cause habitat loss and degradation by desiccating and/or raising the temperatures of small wetlands and streams leading to the loss of freshwater mussels and other aquatic species and species reliant upon these habitats.

11.4 Storms and Flooding

11.4.1 Storms and flooding (Avg. Score: 1.00)

NJ Specific Threats: 11.4.1.1 Extreme storms and flooding events threaten aquatic and marine wildlife through habitat degradation and alteration, including alterations to off-shore or back-bay benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic and marine wildlife.

11.4.1.5 Storm damage can alter forest structure via blow-downs or micro-bursts, and can destroy bird nesting in the locales where the storms occur.

11.4.2 Increased rainfall (Avg. Score: 1.00)

NJ Specific Threats: 11.4.2.1 Extreme rain events threaten aquatic wildlife through habitat degradation and alteration, including alterations to benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic wildlife.

11.4.2.2 Extreme rain events can damage wildlife nesting and resting habitats, including impacts to avian eggs and chick and small mammal survivorship.

11.4.2.3 More frequent rain events can alter terrestrial and wetland vegetation communities as well as wetland hydrology, shifting wildlife community use.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 3.00)

NJ Specific Threats: 12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.2 Lack of up-to-date existing information (Avg. Score: 3.00)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.3 Need to answer research question (Avg. Score: 3.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.4 Need to develop new technique (Avg. Score: 3.00)

NJ Specific Threats: 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 1.00)

NJ Specific Threats: 12.3.0.1 Regulatory habitat protections within state land use regulations are spatially limited to specific geographic areas (e.g., Pinelands, Coastal Area) or geographic features (e.g., wetlands, streams) and so fail to protect critical habitats that exist outside of these regulated areas.

12.3.0.6 Certain geographic or habitat features, such as vernal pools and headwater wetlands or streams, may be too small, mischaracterized, or misidentified to benefit from regulatory protection.

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 1.00)

NJ Specific Threats: 12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.

12.4.0.5 Bureau of Forest Fire Management policy has traditionally implemented prescribed burns on State lands for the sole purpose of public safety (i.e., addressing hazard fuel reduction), missing opportunities to burn in a manner that would additionally manage habitat for ecological diversity.

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 3.00)

NJ Specific Threats: 14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 3.00)

NJ Specific Threats: 14.2.1.1 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various forest management practices.

14.2.1.2 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various aquatic and riparian management practices.

14.2.1.5 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various wetland management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 1.00)

NJ Specific Threats: 15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.5 Secure and promote the protection/restoration of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through incentive programs.

1.2.1.6 Secure and promote the protection/restoration of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.9 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing Forestry Stewardship Programs.

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.12 Create incentives (non-monetary and/or monetary) for land developers to redevelop abandoned areas (e.g., shopping centers, office complexes) to minimize the loss of natural habitats and reduce the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.14 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of herbicides and pesticides, and implementing more ecologically safe strategies when using such products.

1.2.1.15 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of rodenticides, and implementing more ecologically safe strategies when using such products.

1.2.1.16 Create incentives (non-monetary and/or monetary) within State regulations (mitigations requirements or credit, BMP satisfaction, etc.) to promote the use of retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.17 Develop a public-relations oriented certification program for private retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.18 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and land managers to control and reduce the impacts of invasive, native and non-native species in order to increase structural habitat diversity.

1.2.1.19 Create incentives for federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to farmers, woodland landowners, and private landowners to adopt and/or endorse consistent BMPs concerning controlled burns to maintain and/or improve wildlife habitat.

1.2.1.20 Coordinate across government agencies and non-government organizations to create or expand upon tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMP's.

1.2.1.21 Create and/or support market-based programs that subsidize or create branding for products derived sustainably from managed wildlife habitats.

1.2.1.22 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to horse/livestock farm owners and managers to increase structural habitat diversity in and around the farms by managing vegetation for a variety of species, in particular, farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

1.2.1.23 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to provide cost shares and/or plan approvals for management based on management approaches and prescriptions.

1.2.1.24 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners, with habitat of suitable patch size to support breeding grassland-dependent species, to alter the timing of vegetation management to benefit grassland and pollinator species.

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

1.2.1.28 Create incentives to implement dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

2 Direct Management of Natural Resources

2.3 Fire management

2.3.2 Fuel reduction

2.3.2.1 Prevent wildfires by reducing natural fuel (e.g., leaf litter).

2.3.3 Prescribed burning

2.3.3.1 Evaluate different management techniques of prescribed burns that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

2.3.3.2 Conduct prescribed burning in Northern New Jersey forests to maintain and regenerate a mosaic of upland forest habitats.

2.3.3.3 Conduct prescribed burning to improve wildlife habitat.

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.1 Control invasive insect infestations by implementing BMP strategies through biological, chemical and/or mechanical means that will depress, or when appropriate, eradicate populations in a manner that avoids excessive harm to non-target species using BMPs to control infestations and limit their spread based on an inventory of invasive insect distribution and response to outbreaks.

2.8.0.2 Develop, implement, monitor and evaluate pest control/management strategies to reduce the impacts of over-abundant wildlife species (native and/or native, invasive species) on native vegetation and the degradation of habitats supporting SGCN. Over-abundant wildlife species include but are not limited to mute swans, Canada geese, beaver and white-tailed deer.

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.5 Implement biologically safe and appropriate control/management strategies, and where appropriate, eradication strategies to reduce the impacts and/or limit the distribution of invasive and/or non-native plant species within or near aquatic systems using methods that will provide the most protection to the aquatic and riparian ecological system, and minimize disturbance to the soil and wildlife. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.8.0.6 Implement long-term management of invasive and/or non-native plants to help maintain functioning ecological systems and biological diversity, and to enhance travel corridors. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.2 Improve the availability of prey/food resources through terrestrial and aquatic plantings and habitat restoration for SGCN populations, in particular for those populations thought to be limited due wholly or in part to a lack of (or contaminated) food resources, and for migratory species (birds, bats, invertebrates).

2.10.0.3 Restore and/or enhance habitats to benefit urban-associated SGCN.

2.10.0.4 Restore and/or enhance suitable travel corridors connecting conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.8 Protect significant natural and/or unique communities by implementing best management practices when conducting habitat restoration strategies.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.10 Minimize the loss of important habitats (e.g., coastal scrub-shrub and grassy habitats, high and low marsh habitats, etc.) that provide nesting, migrating, and wintering areas for SGCN birds and other coastal and marsh-dependent species through habitat restoration efforts.

2.10.0.11 Restore and/or enhance critical migratory terrestrial and aquatic habitats (e.g., beach, grasslands, forest, scrub-shrub, etc.) for songbirds, raptors, shorebirds, waterfowl, bats and invertebrates through habitat restoration efforts and expand habitat restoration to adjacent private lands to increase the effective size of the habitat.

2.10.0.12 Create and/or maintain scrub-shrub habitats through revegetation efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.15 Restore and/or enhance terrestrial and aquatic habitats proximate to but not adjacent to roads and other transportation corridors for terrestrial-bound SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.10.0.21 Restore and/or enhance understory habitats that suppress invasive species and provide critical resources and enhance sheltering, foraging, and nesting cover for wildlife.

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.11.0.3 Create suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats through vegetation management.

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through vegetation management.

2.11.0.6 Reclaim degraded rare species habitats by conducting vegetation management needed to restore habitat value for the documented/target SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.8 Maintain, enhance and/or restore biologically appropriate buffers for SGCN-inhabited/used freshwater wetlands through vegetation management.

2.11.0.23 Implement appropriate habitat management actions in areas where natural disturbances, such as wildfire, have been precluded.

2.11.0.24 Conduct vegetation management adjacent to aquatic habitats following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.25 Conduct vegetation management along access roads following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.26 Conduct vegetation management along roadsides and medians, avoiding peak activity periods for wildlife, that enhances wildlife dispersal naturally and safely across roads and similar barriers to/between terrestrial and/or aquatic habitats.

2.11.0.27 Conduct vegetation management for target shrub- or young forest-dependent SGCN following BMPs to minimize the risk of the establishment of invasive and non-native plants.

2.11.0.28 Conduct vegetation management in agricultural areas following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.29 Conduct vegetation management on transportation and service corridors (i.e., rights-of-way) following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.30 Identify and prioritize areas where various management tools (such as increasing salinity through the management of water levels or chemical applications) may be effective in reducing phragmites within and restoring marsh habitat.

2.11.0.31 In areas where vegetative communities are shifting due to fire suppression and controlled burns are not feasible, manage vegetation to improve wildlife habitat.

2.11.0.32 Increase structural habitat diversity around and when feasible, within agricultural landscapes by managing vegetation for a variety of species, in particular, those farms that have removed scrub-shrub habitat and/or fragmented forests, and by implementing ecologically best practices (e.g., no-till farming, maintaining hedgerows, buffer set-asides, etc.).

2.11.0.33 Increase structural habitat diversity by implementing long-term vegetation management to minimize the potential for the establishment of invasive and/or non-native plants that may outcompete native vegetation.

2.11.0.34 Increase structural habitat diversity by managing residential, commercial and recreational areas' landscapes for a variety of species. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.35 Increase structural habitat diversity by managing vegetation adjacent to aquatic habitats in a manner that provides a buffer from runoff and erosion and a microclimate to stabilize seasonal temperatures to benefit a variety of aquatic and semi-aquatic species.

2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.

2.11.0.38 Increase structural habitat diversity in and around horse/livestock farms by managing vegetation for a variety of species, in particular, in and around farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

2.11.0.39 Increase structural habitat diversity in and around solar farms by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.40 Increase structural habitat diversity surrounding areas used for energy, mining, and transportation and service corridors by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides, and avoid managing habitat during the breeding seasons for ground-nesting birds, reptiles, amphibians and small mammals.

2.11.0.41 Increase structural habitat diversity through the implementation of a variety of vegetation management practices such a prescribed burns (either increasing or decreasing their frequency depending on the site and objective), plantings, etc. that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.42 Increase structural habitat diversity within wind farms for terrestrial bound and low-flying species and around wind farms for other wildlife by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.43 Manage forests to increase variation in age structure and composition using BMPs that promote and maintain functioning ecological forest-based systems and biological diversity.

2.11.0.45 Regularly and/or rotationally create young forest habitat in targeted areas to maintain and regenerate a mosaic of upland forest habitats that will benefit shrub- and young forest-dependent species.

2.12 Water management

2.12.1 Ditch plugs

2.12.1.1 Implement best management practices (BMPs), protective strategies, and guidelines for ditch plugging to maintain and enhance healthy, resident and migratory SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.12.3 Drainage

2.12.3.2 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) such as removing drainage ditches to restore natural stream flows and wetlands, that benefit wildlife inhabiting these areas.

2.12.3.3 Remove tile drains and drainage ditches to improve wetland hydrology and restore natural stream flows during appropriate times to avoid sensitive periods (e.g., nesting, denning, roosting) and minimizes harm to wildlife, particularly SGCN.

2.12.3.4 Expand the acreages and enhance the effective size of SGCN habitats by reclaiming/restoring adjacent, degraded habitats by removing tile drains and drainage ditches.

2.12.3.5 Remove drainage ditches adjacent to roads to decrease the attraction for amphibians, reptiles and small mammals, and thereby minimizing road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.12.3.6 Protect significant natural and/or unique communities by and when removing tile drains and drainage ditches.

2.12.3.7 Minimize habitat loss of critical coastal habitats that provide nesting, migrating, and wintering areas for birds and other coastal species by maintaining or enhancing these areas by removing drainage ditches.

2.12.3.8 Enhance critical migratory stopover beach habitats for songbirds, raptors, shorebirds, bats and invertebrates by removing drainage ditches and expanding management to adjacent private lands to increase the effective size of the habitat.

2.12.3.9 Implement drain removal on state and other conservation lands to enhance food availability for migratory species (birds, bats, invertebrates).

2.12.3.10 Use tile drain and drainage ditch removal to create feeding and roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

2.12.3.11 Implement best management practices (BMPs), protective strategies, and guidelines when removing tile drains and drainage ditches to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.13 Wildlife damage management

2.13.0 Nuisance fish and wildlife damage

2.13.0.4 Investigate the effects of mosquito control methods on freshwater aquatic and semi-aquatic SGCN including but not limited to, amphibian, fish, dragonfly, and damselfly populations.

2.14 Wildlife disease management

2.14.0 Wildlife disease strategy development and investigation

2.14.0.1 Investigate diseases/pathogens impacting SGCN and/or their habitats.

2.14.0.2 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

2.14.0.3 Protect SGCN from exotic pathogen introduction or incident through implementation of a "rapid response plan"; DFW to give priority attention to these species in planning and/or implementing a response.

2.14.0.4 Conduct long-term monitoring of diseases in vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts.

2.14.0.5 Assess the impacts of diseases on the life cycles of wildlife.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.6 Conduct long-term studies on resident and migratory SGCN to determine if there are changes to the populations' demography (productivity, survival, dispersal) and/or to their critical and/or supporting habitats (i.e., diminishing in value, acreage or connectivity, etc.), in particular changes that would not maintain SGCN at viable levels for species populations. Update data and GIS maps; provide updated information to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.14 Identify areas with invasive, aquatic plants and animals and collect a detailed baseline assessment of the species' status and distribution. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort. Researchers and contractors performing Forest Stewardship Inventories and/or Plans on state lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.0.0.15 Conduct long-term monitoring of areas identified as having invasive, aquatic plants and animals to track the species' status/progress over time with or without the implementation of management strategies. Areas without management strategies should be assessed and prioritized for management/control. Areas where management strategies are being implemented should include an assessment of the management effort and identify/recommend and implement necessary changes to improve its success. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort.

3.0.0.19 Identify the presence and status (e.g., functioning, structure, slated for removal, etc.) of existing dams and culverts within and/or that may impact SGCN and their habitats, and create a database that includes a GIS component identifying the locations of such structures and their status. Share this information with appropriate organizations and/or agencies evaluating the benefits and risks of such structures on SGCN and their habitats.

3.0.0.20 Once baseline data identifying and describing the status of existing dams and culverts have been gathered, conduct evaluations at a variety of sites to determine whether the benefits of culvert and dam creation or removal outweigh the risks to SGCN species and their habitats, and if other variables/conditions specific to individual sites/locations result in a different outcome. Identify and target appropriate dams and culverts for removal and/or reconstruction to minimize harm to SGCN species and their habitats.

3.0.0.26 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species including objectives and guidance pertaining to and the condition/status of critical and supporting habitats.

3.0.0.27 Evaluate the effectiveness of strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals through research and monitoring. Develop and provide NJ DEP and other appropriate governing agencies/commissions a summary of findings and recommendations to improve such efforts.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.3 Survey for and monitor populations of freshwater aquatic focal SGCN to assess the populations' demography, trends, condition, distribution, etc.

3.2.0.7 Track (via a database that includes a GIS component) and research problematic species and diseases to determine their distribution, impacts on SGCN wildlife/wildlife communities, and develop potential control measures.

3.2.0.8 Implement and conduct long-term monitoring of control measures aimed at minimizing the impacts of problematic species and/or diseases to evaluate the effectiveness of such efforts and to identify and incorporate additional strategies as appropriate.

3.2.0.18 Conduct baseline surveys/inventories to better understand the distribution of fish and invertebrate (including freshwater mussels) populations.

3.2.0.21 Investigate the effects of mosquito control methods on freshwater aquatic and semi-aquatic SGCN including but not limited to, amphibian, fish, dragonfly, and damselfly populations.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.2 Age, size and sex structure

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.3 Baseline inventory

3.2.3.9 Investigate hazardous environmental issues that may impact grassland invertebrates.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.6 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) that could, through revegetation and/or enhancement efforts, become suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN.

3.3.1.7 Map and prioritize existing and potential areas for early succession forest management. Share the results with state, county and municipal planners.

3.3.1.8 Assess the availability and suitability of forest habitats for SGCN species (particularly reptiles and amphibians, birds, pollinators, and tiger beetles) in southern forests since Superstorm Sandy.

3.3.1.9 Inventory forests throughout northern New Jersey to develop a baseline characterization of the structure and composition of habitats and identify deficient forest habitat types.

3.3.1.10 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and document fish SGCN habitats by plotting their distributions in GIS and submitting the data to the State for integration into the DEP's Biotics database.

3.3.1.16 Gather "best information" for spatial modeling and update/create a current model/depiction of anticipated habitat shifts from sea-level rise, flooding, etc.

3.3.1.17 Identify and map undeveloped roads and trails in all conserved forests, and create a database of locations. Integrate information regarding potentially sensitive areas.

3.3.1.18 Conduct an assessment using available data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels.

3.3.1.19 Identify and codify legal ORV access areas on state (and if appropriate, other conserved) lands. Provide GIS mapping to the landowner for potential use in directing such recreational activities.

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.1.26 Survey all historic locations and unsurveyed suitable habitats to identify populations of freshwater aquatic focal species.

3.3.2 Monitoring

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.4 Protect water quality and aquatic-dependent species by appropriately designating Category 1 waters and enforcing protective regulations. Seek appropriate classifications for stream segments based on Endangered and Threatened Status and/or the Index of Biotic Integrity (IBI) results that do not fulfill Category One requirements.

3.3.2.5 Conduct long-term monitoring of water quality of SGCN aquatic habitats (and aquatic systems feeding into those habitats) to evaluate protection and management efforts to reduce, if not eliminate, chemical contamination, siltation, eutrophication, and other forms of pollution/contamination of aquatic systems.

3.3.2.8 Evaluate the effectiveness of current prescribed burning practices on Pinelands dependent species.

3.3.2.10 Evaluate the efficacy and success of different management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.3.2.14 Research and evaluate the effectiveness of water quality management practices on water-dependent and semi-dependent SGCN, particularly those practices associated with permitting or mitigation actions.

3.3.2.15 Investigate the effectiveness of management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.3.2.20 Once a system is developed for reporting and qualifying new locations of invasive species, develop, implement and monitor/evaluate invasive species removal strategies at identified locations. Priority should be given to those areas critical to SGCN and/or contain unique and/or rare plant communities supporting SGCN and/or other fish/wildlife species.

3.3.2.24 Conduct regular inventories of forests throughout northern New Jersey to characterize the changing structure and composition of habitats and monitor forest conditions.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.3 Develop/improve management techniques that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.8 Develop best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5.3.9 Develop strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.14 Develop aquaculture practices in the coastal areas that are compatible with the recovery of SGCN.

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.3.16 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.3.19 Work with foresters to develop prescribed burning practices for Pinelands dependent species that increase or maintain habitat quality for these species in the Pinelands.

3.5.3.21 Develop management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.23 Revise water quality management practices based on research on water-dependent and semi-dependent SGCN, particularly when associated with permitting or mitigation actions.

3.5.3.24 Based on research, modify management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.4 Investigate the effects of mosquito control methods on freshwater aquatic and semi-aquatic SGCN including but not limited to, amphibian, fish, dragonfly, and damselfly populations.

3.5.4.5 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

3.5.4.6 Investigate the feasibility of mitigating for the impacts of contaminants to vulnerable wildlife, particularly SGCN. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.5.4.14 Develop and implement agreements, and update existing agreements, with government agencies regarding the protection of critical SGCN habitats (e.g., significant breeding populations of beach nesting birds, colonial waterbird nesting areas, bat colonies, etc.).

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.18 Investigate the effectiveness of survey techniques through selected “ground truthing” and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

3.5.4.21 Develop BMPs to address problematic species and diseases of unknown origin.

4 Education

4.1 Educator/Instructor training

4.1.0 Public education

4.1.0.1 Provide educational resources and training programs to private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

5 Facilities and Areas

5.15 Wildlife Management Areas

5.15.6 Roads

5.15.6.1 Clearly post areas/roads where vehicle access is permitted.

5.15.6.2 Clearly post areas/trails where vehicle access is not permitted.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.3 Secure and protect riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.7 Secure and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.3 Increase the protection of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through conservation area designations.

6.4 Private lands agreements

6.4.0 Private land agreement strategies

6.4.0.1 Enter into private lands agreements to expand control burns on private lands, in particular those adjacent to conserved lands to improve SGCN habitats.

7 Law Enforcement

7.1 Law enforcement

7.1.3 Sub-national Level

7.1.3.2 Increase the number of law enforcement officers tending to wildlife issues to a reasonable number to sufficiently cover the State and marine waters.

7.1.4 Scale Unspecified

7.1.4.1 Improve enforcement of policies and/or regulations that promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.16 Implement policies that protect and restore riparian areas.

7.1.4.17 Improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

7.1.4.26 Educate law enforcement personnel that there may be unauthorized research projects taking place and to encourage them to investigate any activities that appear to be harmful to wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.2 Develop a team of personnel from government entities, conservation organizations and other stakeholders engaged in oil/gas spill response for marine and freshwater habitats to develop a feasible plan for oil spill response and/or to amend NJ's current oil spill response plan that clearly outlines each organizations responsibilities and an assessment and location list of available equipment for boom deployment during oil spills.

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.1.0.4 Engage government agencies, conservation partners and other stakeholders in constructive dialogues encouraging them to influence policy change and the creation of incentives through a habitat bill and/or municipal ordinances for backyard habitat.

8.1.0.15 Engage government agencies, conservation partners and other stakeholders in discussions encouraging and supporting the creation of laws and policies requiring vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

8.1.0.16 Engage local governments in discussions regarding the importance of them adopting/passing ordinances which require assessing and addressing secondary impacts (i.e., ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

8.1.0.17 Engage municipalities in constructive dialogue to identify and minimize destruction of areas prioritized for early succession forest management.

8.1.0.18 Engage NJDOT, NJ Transit Authority and other road management entities, wildlife conservation organizations/agencies (e.g., Division of Fish and Wildlife, New Jersey Conservation Foundation, Conserve Wildlife Foundation of NJ), and communities and citizens in discussions regarding the importance of and methods to enhance habitat connectivity, and work together to develop feasible strategies for ensuring that wildlife can disperse naturally and safely across roads and similar barriers to terrestrial and/or aquatic habitats.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.20 Organize a small focal group of government and non-government agencies/organizations responsible for decisions regarding beach/dune management to share and coordinate their goals so that comprehensive planning can attempt to meet all needs.

8.1.0.21 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation human-subsidized and/or overabundant, native species cause to local nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.22 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation invasive species cause to native nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.26 Coordinate across federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to woodland landowners to adopt or endorse consistent best management practices concerning controlled burns to maintain and/or improve forested habitat for wildlife.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.33 Engage government agencies, conservation partners and other land managers, communities, landowners, and commercial and industrial stakeholders in discussions regarding the importance of protecting and methods to protect priority wetlands beyond the levels afforded through regulation by maintaining and/or restoring optimal biological buffers around wetlands.

8.1.0.34 Work with the NJ Education Association and Department of Education to design curriculum and outdoor experimental learning opportunities, and provide training to teachers on implementation of these activities.

8.1.0.37 Enlist landowners and NJ citizens in the protection of and survey efforts for SGCN, in particular rare species, by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management and wildlife-related volunteer programs.

8.1.0.38 Engage partners, stakeholders and land managers in constructive dialogue promoting forest stewardship for SGCN that use core forests and forested corridors.

8.1.0.40 Encourage researchers, land managers, naturalists and enthusiasts to follow proper procedures for the coordination and/or permitting of research/management activities involving wildlife and sensitive habitats, and discourage activities that alter vegetation or wetlands, or cause harm or disturbance to wildlife.

8.1.0.42 Engage citizens, wildlife observers and photographers through discussions and distributable information regarding the importance of and encouraging implementing responsible and ethical behavior when observing wildlife by developing an alliance of wildlife photographers and widely circulating recommendations on how to reduce impact.

8.1.0.44 Engage conservation partners, stakeholders, government agencies and other land stewards in constructive dialogues encouraging their inclusion of controlled burns in forest and other stewardship plans.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.1.0.48 Form cooperative partnerships with transportation and shipment agencies and companies to facilitate habitat creation and enhancement away from and outside of project areas and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.2 Recruitment and retention activities

8.2.3 For wildlife watching

8.2.3.1 Develop and implement nature-focused tourism opportunities including wildlife viewing sites, interpretive signage highlighting unique ecosystems/habitats, and wildlife-related recreational opportunities that do not negatively impact SGCN or their habitats.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.7 Develop and provide (or otherwise make publicly available) educational programs and/or materials that describe the negative impacts of off-road vehicles and watercraft use in and adjacent to critical SGCN habitats, and the importance of confining such activities to more appropriate locations and/or seasons.

8.3.0.8 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate recreationists and encourage landowners to eliminate garbage in the vicinity of suitable wildlife habitat, in particular SGCN habitat. Information should include the detrimental impacts garbage may have on various wildlife species.

8.3.0.9 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners and land managers to include only native plants in landscaping and restoration projects. Provide information to assist them in detecting problematic establishment of invasive, non-indigenous plants.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.11 Develop and provide (or otherwise make publicly available) educational programs and/or materials to the public, wildlife-related professionals, foresters, etc., that describe the value of species that are often feared (e.g., snakes, bats, spiders, Allegheny woodrat) and/or deemed a "nuisance" (e.g., squirrel, deer, snapping turtle), and therefore, persecuted by people. Include information on tolerance, proper identification, eviction from human dwellings, how to minimize the animal's presence on the property, and/or how to live in harmony with the animal.

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.24 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

8.3.0.25 Develop educational outreach programs for landowners, nurseries and the general public regarding the negative impacts of invasive and non-native plants on our natural communities.

8.3.0.26 Develop educational outreach programs for private and public landowners and land managers regarding the importance of and how to manage core forests and forested corridors in a way that will be beneficial for SGCN, particularly endangered, threatened and special concern species.

8.3.0.27 Develop educational outreach programs for public and private landowners and land managers regarding the importance of structural habitat diversity, methods to increase diversity, and/or incentive programs available to increase habitat diversity.

8.3.0.29 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about the importance of maintaining a vegetative buffer along riparian and aquatic habitats to intercept storm water runoff and minimize soil erosion.

8.3.0.30 Develop educational outreach programs for private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.5 Develop a plan that directs the creation or expansion of energy or utility rights-of-way in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.6 Develop a plan that directs the creation or expansion of roads and railroads or the re-establishment of abandoned railroads within and adjacent to critical forested habitats in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.7 Develop a plan that directs the maintenance of or new channelization of forested streams and rivers in a manner that minimizes impacts of the aquatic ecological system and adjacent forest

9.1.0.8 Develop a plan that focuses on strategies for oil pipelines to avoid sensitive habitats that would be highly impacted by oil spills.

9.1.0.9 Develop a plan that focuses on strategies to minimize the creation of renewable energy farms (e.g., solar, wind) and related infrastructures within and their impacts on forested habitats and the wildlife community.

9.1.0.10 Develop a plan that focuses on strategies to minimize the impacts of mining on critical forested habitats.

9.1.0.11 Develop a plan that focuses on strategies to minimize the impacts of power plants on critical forested habitats and the wildlife community.

9.1.0.13 Develop a plan to minimize agriculture that would result in groundwater withdrawal in critical forested areas.

9.1.0.14 Develop a plan to minimize development that would result in groundwater withdrawal in critical forested areas.

9.1.0.15 Develop a plan to minimize fragmentation of terrestrial and aquatic habitats by roads.

9.1.0.16 Develop a plan to minimize new lawnscapes and preserve natural vegetation within and adjacent to critical forest areas.

9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.31 Develop wetland restoration plans that consider the life history and needs of wildlife occupying targeted habitats.

9.1.0.32 Incorporate aquatic habitat connectivity and water quality/effluent standards into local and state aquaculture plans and BMPs.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.2 Organizational strategic and CMS planning

9.2.1 Organizational strategic and operational planning

9.2.1.1 Identify and codify legal ORV access areas on state lands.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.5 Develop response plans to address disease outbreaks within wildlife populations, in particular SGCN.

9.3.1.7 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.10 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.15 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.1.16 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3 Habitat management planning

9.3.3.5 Develop a management plan using forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

9.3.3.7 Develop a management plan to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

9.3.3.8 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.3.13 Develop a management plan that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas and prevents or ameliorates near-term impacts of climate change throughout the State, but in particular within the coastal and Delaware Bay areas.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.16 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.3.17 Develop a management plan for prescribed burning that will benefit Pinelands dependent species and increase or maintain habitat quality for these species in the Pinelands.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.21 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.3.24 Develop a plan to improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

9.3.3.28 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.3.29 Develop habitat management plans aimed at reducing or eliminating negative impacts of ORVs.

9.3.3.32 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3.34 Include controlled burn prescriptions in forest and stewardship plans to improve wildlife habitat.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.3 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.12 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed solar farm projects to reduce habitat fragmentation and minimize impacts on wildlife.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.2.2 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.2.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into the environmental review process to help establish policies and plans that minimize the impact of aquaculture on fish and wildlife.

11.1.2.4 Review strategies for creating or enhancing connectivity (e.g., installing appropriately-sized wildlife passages) between wetlands to allow wildlife to disperse naturally and safely.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.2 Provide technical support to public and private landowners and land managers for controlling invasive, native and non-native plant species in order to increase structural habitat diversity.

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.7 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on the importance of maintaining habitat connectivity, minimizing fragmentation, and the use of CHANJ products to help them target areas for such planning.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.11 Provide educational resources, training programs, and on-the-ground guidance to private and public landowners and land managers on the benefits of and for creating young forest and early succession habitat for SGCN.

11.2.0.14 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters), and to enhance or restore biologically appropriate buffers.

11.2.0.15 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and landowners about the importance of retaining and in an effort to protect, create, enhance and/or restore vegetation along aquatic habitats.

11.2.0.17 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of vernal pools and the protection, enhancement and/or restoration of biologically appropriate buffers.

11.2.0.22 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

11.2.0.23 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to SGCN habitats to promote the protection and/or enhancement of those adjacent habitats to increase the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and that connect conserved SGCN habitats.

11.2.0.24 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers on how to manage vegetated roadside areas (e.g., mowing, brush-hogging, etc.) on a schedule that avoids peak activity periods for wildlife and therefore, minimizes harm.

11.2.0.25 Provide educational resources, training programs, and on-the-ground guidance to resource managers regarding the assessment of and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) related to residential and commercial development.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.1 Engage partners and stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.3 Provide educational resources, training programs, and on-the-ground guidance to DOD to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop and implement forest management and other practices that minimize disturbances to SGCN (i.e., beyond their federal requirements).

11.2.1.5 Provide educational resources, training programs, and on-the-ground guidance to municipalities, state and federal agency resource managers on tasks such as writing and integrating Beach Management Plans into other management documents.

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

11.2.2 With private landowners

11.2.2.1 Provide technical support to farming operations and woodland landowners on ways to decrease clean farming (edge-to-edge) practices and create ecotones to benefit bobwhite and other species dependent on early successional habitat.

100 Law and Policy

100. Legislation

100.1.3 Sub-national Level

100.1.3.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.3.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.4 County and Local

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.3 Expand the acreages and enhance the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN through local ordinances.

100.1.4.4 Secure wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and biologically appropriate buffers through local ordinances.

100.1.4.5 Secure SGCN-inhabited/used freshwater wetlands and biologically appropriate buffers through local ordinances.

100.1.4.11 Secure riparian areas through local ordinances.

100.1.4.14 Adopt/pass local ordinances which require assessing and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.5.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.5.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into state/local policy to minimize the impact of aquaculture on fish and wildlife.

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100.1.5.5 Develop legislation to provide financial support for the New Jersey Invasive Species Strike Team.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.1 Develop (and/or improve) policies and/or regulations that will promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

100.3.0.5 Develop policies that will promote improved and secure habitat connections between conserved SGCN habitats.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.12 Develop policies that promote the preservation and protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.13 Develop policies that will promote protecting and restoring riparian areas.

100.3.0.14 Develop policies and/or regulations that increase the protective buffers of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) to biologically appropriate distances to benefit SGCN that rely upon these habitats and improve the function of the [associated] aquatic systems.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.23 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.26 Adopt regulations requiring the combined sewer overflow alternative analyses required by regulation address potential impacts to wildlife in watercourses or receiving water bodies.

100.3.0.31 Create or expand tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMPs.

100.3.0.32 Coordinate regulations across agencies to maximize availability of and enrollment in existing Forestry Stewardship Programs (e.g., "Woodland Stewards", Farm Bill, partners, etc.) to maintain and/or improve forest habitat.

100.3.0.38 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.3.0.39 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.3.0.40 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.45 Increase the controlled burn season to focus on restoring vegetative communities.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.48 Propose new State law or regulation mandating that a State-level "development impact fee" be assessed on all new development approved by municipalities (via the Municipal Land Use Law processes), and dedicate such monies to the development and implementation of regional Habitat Conservation Plans (or existing plans/programs serving the same regional function).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.53 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded rights-of-way corridors associated with energy transport/transmission.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.64 Develop regulations that when implemented will protect and restore riparian areas.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100.3.0.73 Develop regulations that would exempt the conversion of lawns to native vegetation (beneficial to wildlife) from local lawn ordinances.

100.3.2 State Land Acquisition Programs

100.3.2.1 Increase opportunities for habitat restoration by making any necessary policy changes to state, federal and local land acquisition programs (e.g., Green Acres, Blue Acres, etc.) to allow for acquisition within abandoned or failing bay shore communities, including mechanisms to relocate displaced people and infrastructure.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.2 Create a policy that requires the NJ DEP to incorporate scientific information regarding climate change and sea level rise (e.g., predictions, habitat management/acquisition efforts to enhance resilience to inundation) on their websites and to work with other government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

100.4.0.3 Develop policies for mandatory buffer strips on preserved farmlands and state-owned agricultural lands.

100.4.0.8 Develop a white paper addressing the impacts that existing, new or expanded rights-of-way have upon wildlife, wildlife habitats and habitat connectivity.

100.4.0.10 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.4.0.11 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.4.0.12 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.4.0.13 Develop policies for different circumstances (e.g., roadsides and medians, riparian, aquatic and terrestrial habitats) that outline appropriate habitat/vegetation management strategies and schedules to minimize risks to and benefit wildlife.

100.4.0.16 Develop policies to implement habitat management strategies that will increase the structural diversity surrounding areas used for energy, mining, and transportation and service corridors which include but are not limited to the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-

100.4.0.17 Develop policies to implement habitat management strategies, including prescribed burns, that will increase the structural diversity on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies to control and reduce the impacts of invasive, non-native species in order to increase structural habitat diversity.

100.4.0.18 Develop policies to minimize the extent of infrastructure associated with energy and service corridors or areas (e.g., wind and solar farms, pipelines, utility lines) and that require the implementation of habitat management strategies that will increase the structural diversity in the area including (e.g., the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides).

100.4.0.19 Develop regulations that will minimize the creation of new barriers, remove or replace current barriers with appropriately-sized systems to accommodate wildlife dispersal, and to minimize road widening and traffic volume increases within critical wildlife habitat areas.

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.21 Ensure that Section 303(d) of the Clean Water Act and applicable State statutory/regulatory requirements for surface water pollutant budgets are being met by monitoring and enforcing regulatory Total Maximum Daily Load (TMDL) targets established within regional Water Quality Management Plans.

100.4.0.22 Work with NJ DEP's Division of Land Use Regulation to ensure protection of listed species and their habitats during stream cleaning events.

100.4.0.24 Develop policies to provide financial support for the New Jersey Invasive Species Strike Team.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Robust Baskettail

Focal species that comprise this Conservation Target:

Robust Baskettail

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:

- 1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.1.1.2 Loss, alteration and/or degradation of habitat.
- 1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.
- 1.1.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:

- 1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.2.1.2 Loss, alteration and/or degradation of habitat.
- 1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.
- 1.2.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:

- 1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.
- 1.3.1.2 Loss, alteration and/or degradation of habitat.
- 1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.
- 1.3.1.6 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture (Avg. Score: 2.00)

NJ Specific Threats:

- 2.1.1.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.2 Small-holder Farming (Avg. Score: 1.00)

NJ Specific Threats: 2.1.2.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.2.2 Fragments terrestrial and aquatic habitats.

2.1.3 Agro-industry (Avg. Score: 1.00)

NJ Specific Threats: 2.1.3.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.3.2 Fragments terrestrial and aquatic habitats.

2.2 Wood and Pulp Plantations

2.2.1 Small Holder (Avg. Score: 1.00)

NJ Specific Threats: 2.2.1.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.2.2 Agro-industry Plantations (Avg. Score: 1.00)

NJ Specific Threats: 2.2.2.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.3 Livestock Farming and Ranching

2.3.2 Small-holder Grazing (Avg. Score: 1.00)

NJ Specific Threats: 2.3.2.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.2.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

2.3.2.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.2.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

2.3.3 Agro-industry Grazing (Avg. Score: 1.00)

NJ Specific Threats: 2.3.3.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.3.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

2.3.3.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.3.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

3 Energy Production and Mining

3.2 Mining and Quarrying

3.2.2 Surface Mining - Rock Quarry (and sand quarries) (Avg. Score: 1.00)

NJ Specific Threats: 3.2.2.1 Fragments terrestrial and aquatic habitats.

3.2.2.2 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

3.3 Renewable Energy

3.3.2 Solar Power (Avg. Score: 1.00)

NJ Specific Threats: 3.3.2.2 Loss, alteration and/or degradation of habitat.

3.4 Conventional Power Plants

3.4.0 Conventional Power Plants (Avg. Score: 1.00)

NJ Specific Threats: 3.4.0.3 Alteration of the temperature, pH and/or hydrology of aquatic ecosystems change plant communities and can harm wildlife and/or impact their behavior and survivorship.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.1.2 Movement of cars and other vehicles on roads and railroads (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 4.1.2.1 Increased vehicle traffic increases the risk of wildlife mortality from strikes.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads (Avg. Score: 1.00)

NJ Specific Threats: 4.2.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species, inhibiting dispersal of non-volant animals, reducing gene flow, and creating barriers to fish when service line-associated roads cross streams (e.g., bridges, culverts, fords, etc.).

4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

4.3 Shipping Lanes

4.3.2 Dredging impacts (Avg. Score: 2.00)

NJ Specific Threats: 4.3.2.1 Threatens wildlife by disrupting/removing stream bottom habitat.

5 Biological Resource Use

5.1 Hunting and Collecting Terrestrial Animals

5.1.1 Intentional Use (Avg. Score: 1.00)

NJ Specific Threats: 5.1.1.1 Illegal collection of wildlife can have detrimental impacts on populations.

5.4 Fishing and Harvesting of Aquatic Resources

5.4.4 Unintentional effects (large scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.4.4.1 Fish introduced for sport fishing can negatively impact native species by competing for resources and/or altering the habitat (e.g., disrupting benthic communities and/or severely impacting aquatic vegetation).

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized) (Avg. Score: 2.00)

NJ Specific Threats: 6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.

6.1.1.3 Increased risk of harassment that results in a change in wildlife behavior and/or direct mortality from vehicle strikes.

6.1.1.6 Off-road vehicles can be a mechanism of transference of wildlife diseases and invasive plant species if gear and apparel are not properly sanitized between sites.

7 Natural Systems Modifications

7.2 Dams and Water Management/Use

7.2.1 Abstraction of Surface Water (domestic use) (Avg. Score: 3.00)

NJ Specific Threats:

7.2.1.1 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.1.2 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.1.3 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, and eliminates shallow water habitats.

7.2.2 Abstraction of Surface Water (commercial use) (Avg. Score: 3.00)

NJ Specific Threats:

7.2.2.1 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, eliminates shallow water habitats, and disrupts/removes stream bottom habitat.

7.2.2.2 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.2.3 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.3 Abstraction of Surface Water (agricultural use) (Avg. Score: 3.00)

NJ Specific Threats:

7.2.3.1 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.3.2 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, and eliminates shallow water habitats.

7.2.3.3 Impounding water to create or expand bogs for cranberry farming leads to the loss of natural wetlands and the alteration of the natural hydrology in the area.

7.2.3.5 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.5 Abstraction of Ground Water (domestic use) (Avg. Score: 3.00)

NJ Specific Threats:

7.2.5.1 Heavy withdrawal of ground water for domestic use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.6 Abstraction of Ground Water (commercial use) (Avg. Score: 3.00)

NJ Specific Threats:

7.2.6.1 Heavy withdrawal of ground water for industrial and commercial use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.7 Abstraction of Ground Water (agricultural use) (Avg. Score: 3.00)

NJ Specific Threats:

7.2.7.1 Heavy withdrawal of ground water for agricultural use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.9 Small Dams (Avg. Score: 3.00)

NJ Specific Threats:

7.2.9.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.10 Large Dams (Avg. Score: 3.00)

NJ Specific Threats: 7.2.10.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.11 Dams (size unknown) (Avg. Score: 3.00)

NJ Specific Threats: 7.2.11.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.13 Stream Burial (Avg. Score: 3.00)

NJ Specific Threats: 7.2.13.1 Eliminates riparian habitats.

7.2.13.3 Alters the hydrology and quality of downstream aquatic and riparian habitats.

7.2.14 Tidal Water Management (Avg. Score: 1.00)

NJ Specific Threats: 7.2.14.1 Freshwater tidal management for flood control alters water levels and salinity in tidal wetlands.

7.2.14.2 Tidal water management for the purpose of managing for select species may alter existing hydrologic or vegetative conditions to the detriment of other species.

7.2.14.3 Open marsh water management (and other techniques) to control mosquito populations may alter existing hydrologic or vegetative conditions to the detriment of other species.

7.3 Other Ecosystem Modifications

7.3.3 Removal of coarse woody debris (streams, forests, scrub-shrub habitats) (Avg. Score: 1.00)

NJ Specific Threats: 7.3.3.1 Decreases the available detritus that normally accumulates behind and within stream obstructions, minimizing or eliminating food sources and shelters for fishes, invertebrates and amphibians.

7.3.3.2 Decreases habitat and/or corridor suitability due to limited or absent shelter and foraging habitat.

7.3.5 Poor habitat management (Avg. Score: 2.00)

NJ Specific Threats: 7.3.5.1 Improper or poorly scheduled maintenance of man-made corridors (e.g., roadsides and medians) can cause direct mortality to and may reduce productivity of wildlife.

7.3.5.2 Shifting from natural vegetation to lawns can cause increased temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

7.3.5.4 Vegetation clearing or inappropriate alteration adjacent to aquatic habitats threatens aquatic species by degrading habitat and water quality (altering temperature and dissolved oxygen, increasing siltation and desiccation, etc.).

7.3.5.9 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, eliminates shallow water habitats, and disrupts/removes stream bottom habitat.

7.3.5.10 Ditching, draining and filling of marshes and wetlands eliminates habitat and degrades the remaining surrounding areas for wildlife.

7.3.5.12 Lack of diversity in age structure and composition of vegetation due to lack of natural disturbances and/or vegetation management.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.1.1.1 Displace or outcompete native species for resources.

8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.

8.1.1.3 Invasive, non-native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

8.1.1.4 Invasive, non-native animals increase the risk of predation on native animals and/or herbivory on native vegetation.

8.1.1.5 Invasive, non-native animals and plants increase the risk of introduction and transference of diseases

8.1.1.6 Invasive, non-native plants may create physical barriers for some species.

8.1.5 Invasive non-native terrestrial/wetland plants (Avg. Score: 2.00)

NJ Specific Threats: 8.1.5.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.1 Domestic and Urban Waste Water

9.1.1 Sewage (Avg. Score: 3.00)

NJ Specific Threats: 9.1.1.1 Degradation of aquatic and marine water quality and habitats by changing turbidity, flow and water chemistry.

9.1.1.2 Leads to increased eutrophication and algae blooms that result in oxygen depletion.

9.1.1.3 Contaminants in sewage treatment effluents and Combined Sewer Overflows can cause developmental and behavioral abnormalities and reproductive failure in wildlife.

9.1.2 Run-off (Avg. Score: 3.00)

NJ Specific Threats: 9.1.2.1 Chemical fertilizers and nutrient run-off changes the pH in streams and ponds and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.1.2.2 Contaminants degrade aquatic and marine water quality and can bioaccumulate in benthic organisms, threatening wildlife by causing developmental and behavioral abnormalities and reproductive failure.

9.1.2.3 Contaminants from road runoff (oil, sediment, salt, etc.) impact native vegetation and the species that rely upon them, degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2 Industrial and Military Effluents

9.2.1 Oil Spills (Avg. Score: 3.00)

NJ Specific Threats: 9.2.1.1 Oil spills render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.1.2 Oil spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.1.3 Oil spills cause external oiling of wildlife and ingestion of oil, both of which can injure or kill wildlife.

9.2.2 Seepage from Mining (Avg. Score: 1.00)

NJ Specific Threats: 9.2.2.1 Contaminants from mining degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2.3 Other (Avg. Score: 3.00)

NJ Specific Threats: 9.2.3.1 Point and nonpoint source pollution such as polychlorinated biphenyls (PCBs), pesticides, heavy metals, and endocrine disrupting compounds (EDC's) into freshwater and marine systems pose threats to wildlife through direct contact and/or ingestion, and to aquatic species and their predators through bioaccumulation, impacting the reproductive success and neurological function of many avian and fish species.

9.2.3.2 Chemical spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.3.3 Chemical spills may render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.5 Other: Industrial toxic settling ponds (Avg. Score: 1.00)

NJ Specific Threats: 9.2.5.1 Surficial or open industrial effluent ponds can cause injury or death to wildlife that become exposed through ingestion or submersion.

9.3 Agricultural and Forestry Effluents

9.3.1 Nutrient Loads (Avg. Score: 3.00)

NJ Specific Threats: 9.3.1.1 Chemical fertilizers and nutrient run-off changes the pH in streams, ponds and wetlands and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.3.1.2 Animal waste degrades terrestrial and aquatic habitats, especially streams, ponds and wetlands, resulting in eutrophication, which disrupts oxygen and nutrient balances, and causes injury and mortality to aquatic organisms.

9.3.2 Soil Erosion and Sedimentation (Avg. Score: 3.00)

NJ Specific Threats: 9.3.2.1 Soil erosion, sedimentation and destruction of streambanks and riparian buffers degrade waters making them unsuitable for riparian-dependent wildlife.

9.3.3 Herbicides and Pesticides (Avg. Score: 3.00)

NJ Specific Threats: 9.3.3.1 Pesticides degrade terrestrial and aquatic habitats, especially streams, ponds and wetlands. Aquatic wildlife are particularly sensitive to these contaminants, which can cause developmental and behavioral abnormalities and reproductive failure. Some contaminants may bioaccumulate in predatory fish and birds and disrupt reproduction.

9.3.3.3 Use of pesticides can directly harm non-target species through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture (Avg. Score: 3.00)

NJ Specific Threats: 9.3.5.1 Use of pesticides, insecticides, and/or herbicides can directly harm non-target species, such as amphibians and beneficial invertebrates through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5.4 Improper use of current insecticides, such as those containing esfenvalerate, prallethrin, or piperonyl butoxide, or past use of pesticides containing chlordane still present in the soils, are toxic to various wildlife species, and can cause injury, mortality, or other effects that impair population viability.

9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.5 Air-Bourne Pollutants

9.5.1 Acid Rain (Avg. Score: 1.00)

NJ Specific Threats: 9.5.1.1 Causes acidification of water bodies, resulting in changes to aquatic and marine communities and reducing biodiversity, and creating conditions that are unsuitable for some aquatic (freshwater and marine) and semi-aquatic species that are sensitive to pH shifts.

9.5.4 Other (Avg. Score: 1.00)

NJ Specific Threats: 9.5.4.1 Dust and/or airborne sedimentation from construction sites, agricultural operations or related earth disturbances can introduce mineral or organic sediments into adjacent wildlife habitats, degrading their quality and suitability for wildlife short-term and/or long-term.

9.5.6 Herbicides and Pesticides (Avg. Score: 3.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

9.6 Excess Energy

9.6.2 Thermal Pollution (Avg. Score: 1.00)

NJ Specific Threats: 9.6.2.2 Water temperature changes to aquatic systems can deter or preclude use by SGCN (e.g., alter habitat suitability for wildlife species, reduce prey base) or present stressors that are harmful if not fatal to wildlife.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 3.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.2 Droughts

11.2.1 Droughts (Avg. Score: 3.00)

NJ Specific Threats: 11.2.1.1 Contribute to hardened soils, decreasing water recharge during rains and increasing the likelihood of flash floods during storms.

11.2.1.2 Lead to lower groundwater levels and therefore, less available water for people and habitats.

11.2.1.3 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

11.3 Temperature Extremes

11.3.1 Temperature extremes (Avg. Score: 1.00)

NJ Specific Threats: 11.3.1.1 Increasing temperatures may cause habitat loss and degradation by desiccating and/or raising the temperatures of small wetlands and streams leading to the loss of freshwater mussels and other aquatic species and species reliant upon these habitats.

11.3.1.2 Increased temperatures can negatively impact wetland, riverine, lacustrine and vernal pool-associated or -dependent wildlife by reducing flows, increasing water temperatures, lowering water levels and causing premature drying of vernal habitats.

11.3.1.3 Temperature extremes of surface water and air degrades marine habitats and ecosystems, threatening marine wildlife. Such extremes also disrupt offshore currents and migratory patterns, species' ranges, and/or impact communities/food chains, all of which further impact the ecosystem.

11.4 Storms and Flooding

11.4.1 Storms and flooding (Avg. Score: 3.00)

NJ Specific Threats: 11.4.1.1 Extreme storms and flooding events threaten aquatic and marine wildlife through habitat degradation and alteration, including alterations to off-shore or back-bay benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic and marine wildlife.

11.4.1.5 Storm damage can alter forest structure via blow-downs or micro-bursts, and can destroy bird nesting in the locales where the storms occur.

11.4.2 Increased rainfall (Avg. Score: 2.00)

NJ Specific Threats: 11.4.2.1 Extreme rain events threaten aquatic wildlife through habitat degradation and alteration, including alterations to benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic wildlife.

11.4.2.2 Extreme rain events can damage wildlife nesting and resting habitats, including impacts to avian eggs and chick and small mammal survivorship.

11.4.2.3 More frequent rain events can alter terrestrial and wetland vegetation communities as well as wetland hydrology, shifting wildlife community use.

11.6 Phenology Shifting or Alteration

11.6.3 Phenology shifts related to species redistribution (Avg. Score: 1.00)

NJ Specific Threats: 11.6.3.1 Shifts in timing of species migration, breeding and hibernation, and available food resources, as a result of wildlife range shifts driven by climate change.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 3.00)

NJ Specific Threats: 12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.2 Lack of up-to-date existing information (Avg. Score: 3.00)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.3 Need to answer research question (Avg. Score: 3.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.4 Need to develop new technique (Avg. Score: 3.00)

NJ Specific Threats: 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 1.00)

NJ Specific Threats: 12.3.0.1 Regulatory habitat protections within state land use regulations are spatially limited to specific geographic areas (e.g., Pinelands, Coastal Area) or geographic features (e.g., wetlands, streams) and so fail to protect critical habitats that exist outside of these regulated areas.

12.3.0.6 Certain geographic or habitat features, such as vernal pools and headwater wetlands or streams, may be too small, mischaracterized, or misidentified to benefit from regulatory protection.

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 1.00)

NJ Specific Threats: 12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.

12.4.0.5 Bureau of Forest Fire Management policy has traditionally implemented prescribed burns on State lands for the sole purpose of public safety (i.e., addressing hazard fuel reduction), missing opportunities to burn in a manner that would additionally manage habitat for ecological diversity.

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 3.00)

NJ Specific Threats: 14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 3.00)

NJ Specific Threats: 14.2.1.1 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various forest management practices.

14.2.1.2 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various aquatic and riparian management practices.

14.2.1.5 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various wetland management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 1.00)

NJ Specific Threats: 15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.6 Secure and promote the protection/restoration of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers through incentive programs.

1.2.1.7 Secure and promote the protection/restoration of fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.9 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing Forestry Stewardship Programs.

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.12 Create incentives (non-monetary and/or monetary) for land developers to redevelop abandoned areas (e.g., shopping centers, office complexes) to minimize the loss of natural habitats and reduce the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.14 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of herbicides and pesticides, and implementing more ecologically safe strategies when using such products.

1.2.1.15 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of rodenticides, and implementing more ecologically safe strategies when using such products.

1.2.1.16 Create incentives (non-monetary and/or monetary) within State regulations (mitigations requirements or credit, BMP satisfaction, etc.) to promote the use of retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.17 Develop a public-relations oriented certification program for private retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.18 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and land managers to control and reduce the impacts of invasive, native and non-native species in order to increase structural habitat diversity.

1.2.1.19 Create incentives for federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to farmers, woodland landowners, and private landowners to adopt and/or endorse consistent BMPs concerning controlled burns to maintain and/or improve wildlife habitat.

1.2.1.20 Coordinate across government agencies and non-government organizations to create or expand upon tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMP's.

1.2.1.21 Create and/or support market-based programs that subsidize or create branding for products derived sustainably from managed wildlife habitats.

1.2.1.22 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to horse/livestock farm owners and managers to increase structural habitat diversity in and around the farms by managing vegetation for a variety of species, in particular, farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

1.2.1.23 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to provide cost shares and/or plan approvals for management based on management approaches and prescriptions.

1.2.1.24 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners, with habitat of suitable patch size to support breeding grassland-dependent species, to alter the timing of vegetation management to benefit grassland and pollinator species.

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

2 Direct Management of Natural Resources

2.3 Fire management

2.3.2 Fuel reduction

2.3.2.1 Prevent wildfires by reducing natural fuel (e.g., leaf litter).

2.3.3 Prescribed burning

2.3.3.1 Evaluate different management techniques of prescribed burns that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

2.3.3.2 Conduct prescribed burning in Northern New Jersey forests to maintain and regenerate a mosaic of upland forest habitats.

2.3.3.3 Conduct prescribed burning to improve wildlife habitat.

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.1 Control invasive insect infestations by implementing BMP strategies through biological, chemical and/or mechanical means that will depress, or when appropriate, eradicate populations in a manner that avoids excessive harm to non-target species using BMPs to control infestations and limit their spread based on an inventory of invasive insect distribution and response to outbreaks.

2.8.0.2 Develop, implement, monitor and evaluate pest control/management strategies to reduce the impacts of over-abundant wildlife species (native and/or native, invasive species) on native vegetation and the degradation of habitats supporting SGCN. Over-abundant wildlife species include but are not limited to mute swans, Canada geese, beaver and white-tailed deer.

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.5 Implement biologically safe and appropriate control/management strategies, and where appropriate, eradication strategies to reduce the impacts and/or limit the distribution of invasive and/or non-native plant species within or near aquatic systems using methods that will provide the most protection to the aquatic and riparian ecological system, and minimize disturbance to the soil and wildlife. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.8.0.6 Implement long-term management of invasive and/or non-native plants to help maintain functioning ecological systems and biological diversity, and to enhance travel corridors. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.2 Improve the availability of prey/food resources through terrestrial and aquatic plantings and habitat restoration for SGCN populations, in particular for those populations thought to be limited due wholly or in part to a lack of (or contaminated) food resources, and for migratory species (birds, bats, invertebrates).

2.10.0.3 Restore and/or enhance habitats to benefit urban-associated SGCN.

2.10.0.4 Restore and/or enhance suitable travel corridors connecting conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.8 Protect significant natural and/or unique communities by implementing best management practices when conducting habitat restoration strategies.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.10 Minimize the loss of important habitats (e.g., coastal scrub-shrub and grassy habitats, high and low marsh habitats, etc.) that provide nesting, migrating, and wintering areas for SGCN birds and other coastal and marsh-dependent species through habitat restoration efforts.

2.10.0.11 Restore and/or enhance critical migratory terrestrial and aquatic habitats (e.g., beach, grasslands, forest, scrub-shrub, etc.) for songbirds, raptors, shorebirds, waterfowl, bats and invertebrates through habitat restoration efforts and expand habitat restoration to adjacent private lands to increase the effective size of the habitat.

2.10.0.12 Create and/or maintain scrub-shrub habitats through revegetation efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.15 Restore and/or enhance terrestrial and aquatic habitats proximate to but not adjacent to roads and other transportation corridors for terrestrial-bound SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.10.0.21 Restore and/or enhance understory habitats that suppress invasive species and provide critical resources and enhance sheltering, foraging, and nesting cover for wildlife.

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.11.0.3 Create suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats through vegetation management.

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through vegetation management.

2.11.0.6 Reclaim degraded rare species habitats by conducting vegetation management needed to restore habitat value for the documented/target SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.8 Maintain, enhance and/or restore biologically appropriate buffers for SGCN-inhabited/used freshwater wetlands through vegetation management.

2.11.0.23 Implement appropriate habitat management actions in areas where natural disturbances, such as wildfire, have been precluded.

2.11.0.24 Conduct vegetation management adjacent to aquatic habitats following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.25 Conduct vegetation management along access roads following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.26 Conduct vegetation management along roadsides and medians, avoiding peak activity periods for wildlife, that enhances wildlife dispersal naturally and safely across roads and similar barriers to/between terrestrial and/or aquatic habitats.

2.11.0.27 Conduct vegetation management for target shrub- or young forest-dependent SGCN following BMPs to minimize the risk of the establishment of invasive and non-native plants.

2.11.0.28 Conduct vegetation management in agricultural areas following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.29 Conduct vegetation management on transportation and service corridors (i.e., rights-of-way) following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.30 Identify and prioritize areas where various management tools (such as increasing salinity through the management of water levels or chemical applications) may be effective in reducing phragmites within and restoring marsh habitat.

2.11.0.31 In areas where vegetative communities are shifting due to fire suppression and controlled burns are not feasible, manage vegetation to improve wildlife habitat.

2.11.0.32 Increase structural habitat diversity around and when feasible, within agricultural landscapes by managing vegetation for a variety of species, in particular, those farms that have removed scrub-shrub habitat and/or fragmented forests, and by implementing ecologically best practices (e.g., no-till farming, maintaining hedgerows, buffer set-asides, etc.).

2.11.0.33 Increase structural habitat diversity by implementing long-term vegetation management to minimize the potential for the establishment of invasive and/or non-native plants that may outcompete native vegetation.

2.11.0.34 Increase structural habitat diversity by managing residential, commercial and recreational areas' landscapes for a variety of species. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.35 Increase structural habitat diversity by managing vegetation adjacent to aquatic habitats in a manner that provides a buffer from runoff and erosion and a microclimate to stabilize seasonal temperatures to benefit a variety of aquatic and semi-aquatic species.

2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.

2.11.0.38 Increase structural habitat diversity in and around horse/livestock farms by managing vegetation for a variety of species, in particular, in and around farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

2.11.0.39 Increase structural habitat diversity in and around solar farms by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.40 Increase structural habitat diversity surrounding areas used for energy, mining, and transportation and service corridors by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides, and avoid managing habitat during the breeding seasons for ground-nesting birds, reptiles, amphibians and small mammals.

2.11.0.41 Increase structural habitat diversity through the implementation of a variety of vegetation management practices such a prescribed burns (either increasing or decreasing their frequency depending on the site and objective), plantings, etc. that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.42 Increase structural habitat diversity within wind farms for terrestrial bound and low-flying species and around wind farms for other wildlife by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.43 Manage forests to increase variation in age structure and composition using BMPs that promote and maintain functioning ecological forest-based systems and biological diversity.

2.11.0.45 Regularly and/or rotationally create young forest habitat in targeted areas to maintain and regenerate a mosaic of upland forest habitats that will benefit shrub- and young forest-dependent species.

2.12 Water management

2.12.1 Ditch plugs

2.12.1.1 Implement best management practices (BMPs), protective strategies, and guidelines for ditch plugging to maintain and enhance healthy, resident and migratory SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.12.3 Drainage

2.12.3.2 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) such as removing drainage ditches to restore natural stream flows and wetlands, that benefit wildlife inhabiting these areas.

2.12.3.3 Remove tile drains and drainage ditches to improve wetland hydrology and restore natural stream flows during appropriate times to avoid sensitive periods (e.g., nesting, denning, roosting) and minimizes harm to wildlife, particularly SGCN.

2.12.3.4 Expand the acreages and enhance the effective size of SGCN habitats by reclaiming/restoring adjacent, degraded habitats by removing tile drains and drainage ditches.

2.12.3.5 Remove drainage ditches adjacent to roads to decrease the attraction for amphibians, reptiles and small mammals, and thereby minimizing road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.12.3.6 Protect significant natural and/or unique communities by and when removing tile drains and drainage ditches.

2.12.3.7 Minimize habitat loss of critical coastal habitats that provide nesting, migrating, and wintering areas for birds and other coastal species by maintaining or enhancing these areas by removing drainage ditches.

2.12.3.8 Enhance critical migratory stopover beach habitats for songbirds, raptors, shorebirds, bats and invertebrates by removing drainage ditches and expanding management to adjacent private lands to increase the effective size of the habitat.

2.12.3.9 Implement drain removal on state and other conservation lands to enhance food availability for migratory species (birds, bats, invertebrates).

2.12.3.10 Use tile drain and drainage ditch removal to create feeding and roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

2.12.3.11 Implement best management practices (BMPs), protective strategies, and guidelines when removing tile drains and drainage ditches to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.13 Wildlife damage management

2.13.0 Nuisance fish and wildlife damage

2.13.0.4 Investigate the effects of mosquito control methods on freshwater aquatic and semi-aquatic SGCN including but not limited to, amphibian, fish, dragonfly, and damselfly populations.

2.14 Wildlife disease management

2.14.0 Wildlife disease strategy development and investigation

2.14.0.1 Investigate diseases/pathogens impacting SGCN and/or their habitats.

2.14.0.2 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

2.14.0.3 Protect SGCN from exotic pathogen introduction or incident through implementation of a "rapid response plan"; DFW to give priority attention to these species in planning and/or implementing a response.

2.14.0.4 Conduct long-term monitoring of diseases in vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts.

2.14.0.5 Assess the impacts of diseases on the life cycles of wildlife.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.14 Identify areas with invasive, aquatic plants and animals and collect a detailed baseline assessment of the species' status and distribution. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort. Researchers and contractors performing Forest Stewardship Inventories and/or Plans on state lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.0.0.15 Conduct long-term monitoring of areas identified as having invasive, aquatic plants and animals to track the species' status/progress over time with or without the implementation of management strategies. Areas without management strategies should be assessed and prioritized for management/control. Areas where management strategies are being implemented should include an assessment of the management effort and identify/recommend and implement necessary changes to improve its success. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort.

3.0.0.19 Identify the presence and status (e.g., functioning, structure, slated for removal, etc.) of existing dams and culverts within and/or that may impact SGCN and their habitats, and create a database that includes a GIS component identifying the locations of such structures and their status. Share this information with appropriate organizations and/or agencies evaluating the benefits and risks of such structures on SGCN and their habitats.

3.0.0.20 Once baseline data identifying and describing the status of existing dams and culverts have been gathered, conduct evaluations at a variety of sites to determine whether the benefits of culvert and dam creation or removal outweigh the risks to SGCN species and their habitats, and if other variables/conditions specific to individual sites/locations result in a different outcome. Identify and target appropriate dams and culverts for removal and/or reconstruction to minimize harm to SGCN species and their habitats.

3.0.0.23 Identify (through wildlife and aquatic system surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and research water quality parameters for all [types of] aquatic systems for various SGCN populations.

3.0.0.26 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species including objectives and guidance pertaining to and the condition/status of critical and supporting habitats.

3.0.0.27 Evaluate the effectiveness of strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals through research and monitoring. Develop and provide NJ DEP and other appropriate governing agencies/commissions a summary of findings and recommendations to improve such efforts.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.3 Survey for and monitor populations of freshwater aquatic focal SGCN to assess the populations' demography, trends, condition, distribution, etc.

3.2.0.7 Track (via a database that includes a GIS component) and research problematic species and diseases to determine their distribution, impacts on SGCN wildlife/wildlife communities, and develop potential control measures.

3.2.0.8 Implement and conduct long-term monitoring of control measures aimed at minimizing the impacts of problematic species and/or diseases to evaluate the effectiveness of such efforts and to identify and incorporate additional strategies as appropriate.

3.2.0.18 Conduct baseline surveys/inventories to better understand the distribution of fish and invertebrate (including freshwater mussels) populations.

3.2.0.21 Investigate the effects of mosquito control methods on freshwater aquatic and semi-aquatic SGCN including but not limited to, amphibian, fish, dragonfly, and damselfly populations.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.2 Age, size and sex structure

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.3 Baseline inventory

3.2.3.9 Investigate hazardous environmental issues that may impact grassland invertebrates.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.6 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) that could, through revegetation and/or enhancement efforts, become suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN.

3.3.1.7 Map and prioritize existing and potential areas for early succession forest management. Share the results with state, county and municipal planners.

3.3.1.8 Assess the availability and suitability of forest habitats for SGCN species (particularly reptiles and amphibians, birds, pollinators, and tiger beetles) in southern forests since Superstorm Sandy.

3.3.1.10 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and document fish SGCN habitats by plotting their distributions in GIS and submitting the data to the State for integration into the DEP's Biotics database.

3.3.1.16 Gather "best information" for spatial modeling and update/create a current model/depiction of anticipated habitat shifts from sea-level rise, flooding, etc.

3.3.1.17 Identify and map undeveloped roads and trails in all conserved forests, and create a database of locations. Integrate information regarding potentially sensitive areas.

3.3.1.18 Conduct an assessment using available data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels.

3.3.1.19 Identify and codify legal ORV access areas on state (and if appropriate, other conserved) lands. Provide GIS mapping to the landowner for potential use in directing such recreational activities.

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.1.26 Survey all historic locations and unsurveyed suitable habitats to identify populations of freshwater aquatic focal species.

3.3.2 Monitoring

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.4 Protect water quality and aquatic-dependent species by appropriately designating Category 1 waters and enforcing protective regulations. Seek appropriate classifications for stream segments based on Endangered and Threatened Status and/or the Index of Biotic Integrity (IBI) results that do not fulfill Category One requirements.

3.3.2.5 Conduct long-term monitoring of water quality of SGCN aquatic habitats (and aquatic systems feeding into those habitats) to evaluate protection and management efforts to reduce, if not eliminate, chemical contamination, siltation, eutrophication, and other forms of pollution/contamination of aquatic systems.

3.3.2.8 Evaluate the effectiveness of current prescribed burning practices on Pinelands dependent species.

3.3.2.10 Evaluate the efficacy and success of different management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.3.2.14 Research and evaluate the effectiveness of water quality management practices on water-dependent and semi-dependent SGCN, particularly those practices associated with permitting or mitigation actions.

3.3.2.15 Investigate the effectiveness of management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.3.2.20 Once a system is developed for reporting and qualifying new locations of invasive species, develop, implement and monitor/evaluate invasive species removal strategies at identified locations. Priority should be given to those areas critical to SGCN and/or contain unique and/or rare plant communities supporting SGCN and/or other fish/wildlife species.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.3 Develop/improve management techniques that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.8 Develop best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5.3.9 Develop strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.14 Develop aquaculture practices in the coastal areas that are compatible with the recovery of SGCN.

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.3.16 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.3.19 Work with foresters to develop prescribed burning practices for Pinelands dependent species that increase or maintain habitat quality for these species in the Pinelands.

3.5.3.21 Develop management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.23 Revise water quality management practices based on research on water-dependent and semi-dependent SGCN, particularly when associated with permitting or mitigation actions.

3.5.3.24 Based on research, modify management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.4 Investigate the effects of mosquito control methods on freshwater aquatic and semi-aquatic SGCN including but not limited to, amphibian, fish, dragonfly, and damselfly populations.

3.5.4.5 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

3.5.4.6 Investigate the feasibility of mitigating for the impacts of contaminants to vulnerable wildlife, particularly SGCN. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.5.4.14 Develop and implement agreements, and update existing agreements, with government agencies regarding the protection of critical SGCN habitats (e.g., significant breeding populations of beach nesting birds, colonial waterbird nesting areas, bat colonies, etc.).

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.18 Investigate the effectiveness of survey techniques through selected “ground truthing” and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

3.5.4.21 Develop BMPs to address problematic species and diseases of unknown origin.

4 Education

4.1 Educator/Instructor training

4.1.0 Public education

4.1.0.1 Provide educational resources and training programs to private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

5 Facilities and Areas

5.15 Wildlife Management Areas

5.15.6 Roads

5.15.6.1 Clearly post areas/roads where vehicle access is permitted.

5.15.6.2 Clearly post areas/trails where vehicle access is not permitted.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.3 Secure and protect riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.7 Secure and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.3 Increase the protection of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through conservation area designations.

7 Law Enforcement

7.1 Law enforcement

7.1.3 Sub-national Level

7.1.3.2 Increase the number of law enforcement officers tending to wildlife issues to a reasonable number to sufficiently cover the State and marine waters.

7.1.4 Scale Unspecified

7.1.4.1 Improve enforcement of policies and/or regulations that promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.16 Implement policies that protect and restore riparian areas.

7.1.4.17 Improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

7.1.4.26 Educate law enforcement personnel that there may be unauthorized research projects taking place and to encourage them to investigate any activities that appear to be harmful to wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.2 Develop a team of personnel from government entities, conservation organizations and other stakeholders engaged in oil/gas spill response for marine and freshwater habitats to develop a feasible plan for oil spill response and/or to amend NJ's current oil spill response plan that clearly outlines each organizations responsibilities and an assessment and location list of available equipment for boom deployment during oil spills.

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.1.0.4 Engage government agencies, conservation partners and other stakeholders in constructive dialogues encouraging them to influence policy change and the creation of incentives through a habitat bill and/or municipal ordinances for backyard habitat.

8.1.0.15 Engage government agencies, conservation partners and other stakeholders in discussions encouraging and supporting the creation of laws and policies requiring vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

8.1.0.16 Engage local governments in discussions regarding the importance of them adopting/passing ordinances which require assessing and addressing secondary impacts (i.e., ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

8.1.0.17 Engage municipalities in constructive dialogue to identify and minimize destruction of areas prioritized for early succession forest management.

8.1.0.18 Engage NJDOT, NJ Transit Authority and other road management entities, wildlife conservation organizations/agencies (e.g., Division of Fish and Wildlife, New Jersey Conservation Foundation, Conserve Wildlife Foundation of NJ), and communities and citizens in discussions regarding the importance of and methods to enhance habitat connectivity, and work together to develop feasible strategies for ensuring that wildlife can disperse naturally and safely across roads and similar barriers to terrestrial and/or aquatic habitats.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.20 Organize a small focal group of government and non-government agencies/organizations responsible for decisions regarding beach/dune management to share and coordinate their goals so that comprehensive planning can attempt to meet all needs.

8.1.0.21 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation human-subsidized and/or overabundant, native species cause to local nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.22 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation invasive species cause to native nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.26 Coordinate across federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to woodland landowners to adopt or endorse consistent best management practices concerning controlled burns to maintain and/or improve forested habitat for wildlife.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.33 Engage government agencies, conservation partners and other land managers, communities, landowners, and commercial and industrial stakeholders in discussions regarding the importance of protecting and methods to protect priority wetlands beyond the levels afforded through regulation by maintaining and/or restoring optimal biological buffers around wetlands.

8.1.0.34 Work with the NJ Education Association and Department of Education to design curriculum and outdoor experimental learning opportunities, and provide training to teachers on implementation of these activities.

8.1.0.37 Enlist landowners and NJ citizens in the protection of and survey efforts for SGCN, in particular rare species, by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management and wildlife-related volunteer programs.

8.1.0.38 Engage partners, stakeholders and land managers in constructive dialogue promoting forest stewardship for SGCN that use core forests and forested corridors.

8.1.0.40 Encourage researchers, land managers, naturalists and enthusiasts to follow proper procedures for the coordination and/or permitting of research/management activities involving wildlife and sensitive habitats, and discourage activities that alter vegetation or wetlands, or cause harm or disturbance to wildlife.

8.1.0.42 Engage citizens, wildlife observers and photographers through discussions and distributable information regarding the importance of and encouraging implementing responsible and ethical behavior when observing wildlife by developing an alliance of wildlife photographers and widely circulating recommendations on how to reduce impact.

8.1.0.44 Engage conservation partners, stakeholders, government agencies and other land stewards in constructive dialogues encouraging their inclusion of controlled burns in forest and other stewardship plans.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.1.0.48 Form cooperative partnerships with transportation and shipment agencies and companies to facilitate habitat creation and enhancement away from and outside of project areas and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.2 Recruitment and retention activities

8.2.3 For wildlife watching

8.2.3.1 Develop and implement nature-focused tourism opportunities including wildlife viewing sites, interpretive signage highlighting unique ecosystems/habitats, and wildlife-related recreational opportunities that do not negatively impact SGCN or their habitats.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.7 Develop and provide (or otherwise make publicly available) educational programs and/or materials that describe the negative impacts of off-road vehicles and watercraft use in and adjacent to critical SGCN habitats, and the importance of confining such activities to more appropriate locations and/or seasons.

8.3.0.8 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate recreationists and encourage landowners to eliminate garbage in the vicinity of suitable wildlife habitat, in particular SGCN habitat. Information should include the detrimental impacts garbage may have on various wildlife species.

8.3.0.9 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners and land managers to include only native plants in landscaping and restoration projects. Provide information to assist them in detecting problematic establishment of invasive, non-indigenous plants.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.11 Develop and provide (or otherwise make publicly available) educational programs and/or materials to the public, wildlife-related professionals, foresters, etc., that describe the value of species that are often feared (e.g., snakes, bats, spiders, Allegheny woodrat) and/or deemed a "nuisance" (e.g., squirrel, deer, snapping turtle), and therefore, persecuted by people. Include information on tolerance, proper identification, eviction from human dwellings, how to minimize the animal's presence on the property, and/or how to live in harmony with the animal.

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.24 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

8.3.0.25 Develop educational outreach programs for landowners, nurseries and the general public regarding the negative impacts of invasive and non-native plants on our natural communities.

8.3.0.26 Develop educational outreach programs for private and public landowners and land managers regarding the importance of and how to manage core forests and forested corridors in a way that will be beneficial for SGCN, particularly endangered, threatened and special concern species.

8.3.0.27 Develop educational outreach programs for public and private landowners and land managers regarding the importance of structural habitat diversity, methods to increase diversity, and/or incentive programs available to increase habitat diversity.

8.3.0.29 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about the importance of maintaining a vegetative buffer along riparian and aquatic habitats to intercept storm water runoff and minimize soil erosion.

8.3.0.30 Develop educational outreach programs for private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.5 Develop a plan that directs the creation or expansion of energy or utility rights-of-way in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.6 Develop a plan that directs the creation or expansion of roads and railroads or the re-establishment of abandoned railroads within and adjacent to critical forested habitats in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.7 Develop a plan that directs the maintenance of or new channelization of forested streams and rivers in a manner that minimizes impacts of the aquatic ecological system and adjacent forest

9.1.0.8 Develop a plan that focuses on strategies for oil pipelines to avoid sensitive habitats that would be highly impacted by oil spills.

9.1.0.9 Develop a plan that focuses on strategies to minimize the creation of renewable energy farms (e.g., solar, wind) and related infrastructures within and their impacts on forested habitats and the wildlife community.

9.1.0.10 Develop a plan that focuses on strategies to minimize the impacts of mining on critical forested habitats.

9.1.0.11 Develop a plan that focuses on strategies to minimize the impacts of power plants on critical forested habitats and the wildlife community.

9.1.0.12 Develop a plan to avoid freshwater tidal management.

9.1.0.13 Develop a plan to minimize agriculture that would result in groundwater withdrawal in critical forested areas.

9.1.0.14 Develop a plan to minimize development that would result in groundwater withdrawal in critical forested areas.

9.1.0.15 Develop a plan to minimize fragmentation of terrestrial and aquatic habitats by roads.

9.1.0.16 Develop a plan to minimize new lawnscapes and preserve natural vegetation within and adjacent to critical forest areas.

9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.31 Develop wetland restoration plans that consider the life history and needs of wildlife occupying targeted habitats.

9.1.0.32 Incorporate aquatic habitat connectivity and water quality/effluent standards into local and state aquaculture plans and BMPs.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.2 Organizational strategic and CMS planning

9.2.1 Organizational strategic and operational planning

9.2.1.1 Identify and codify legal ORV access areas on state lands.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.5 Develop response plans to address disease outbreaks within wildlife populations, in particular SGCN.

9.3.1.7 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.10 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.15 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.1.16 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3 Habitat management planning

9.3.3.5 Develop a management plan using forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

9.3.3.7 Develop a management plan to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

9.3.3.8 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.3.13 Develop a management plan that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas and prevents or ameliorates near-term impacts of climate change throughout the State, but in particular within the coastal and Delaware Bay areas.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.16 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.3.17 Develop a management plan for prescribed burning that will benefit Pinelands dependent species and increase or maintain habitat quality for these species in the Pinelands.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.21 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.3.24 Develop a plan to improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

9.3.3.28 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.3.29 Develop habitat management plans aimed at reducing or eliminating negative impacts of ORVs.

9.3.3.32 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3.34 Include controlled burn prescriptions in forest and stewardship plans to improve wildlife habitat.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.3 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.12 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed solar farm projects to reduce habitat fragmentation and minimize impacts on wildlife.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.2.2 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.2.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into the environmental review process to help establish policies and plans that minimize the impact of aquaculture on fish and wildlife.

11.1.2.4 Review strategies for creating or enhancing connectivity (e.g., installing appropriately-sized wildlife passages) between wetlands to allow wildlife to disperse naturally and safely.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.2 Provide technical support to public and private landowners and land managers for controlling invasive, native and non-native plant species in order to increase structural habitat diversity.

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.7 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on the importance of maintaining habitat connectivity, minimizing fragmentation, and the use of CHANJ products to help them target areas for such planning.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.11 Provide educational resources, training programs, and on-the-ground guidance to private and public landowners and land managers on the benefits of and for creating young forest and early succession habitat for SGCN.

11.2.0.14 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters), and to enhance or restore biologically appropriate buffers.

11.2.0.15 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and landowners about the importance of retaining and in an effort to protect, create, enhance and/or restore vegetation along aquatic habitats.

11.2.0.17 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of vernal pools and the protection, enhancement and/or restoration of biologically appropriate buffers.

11.2.0.22 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

11.2.0.23 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to SGCN habitats to promote the protection and/or enhancement of those adjacent habitats to increase the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and that connect conserved SGCN habitats.

11.2.0.24 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers on how to manage vegetated roadside areas (e.g., mowing, brush-hogging, etc.) on a schedule that avoids peak activity periods for wildlife and therefore, minimizes harm.

11.2.0.25 Provide educational resources, training programs, and on-the-ground guidance to resource managers regarding the assessment of and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) related to residential and commercial development.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.1 Engage partners and stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.3 Provide educational resources, training programs, and on-the-ground guidance to DOD to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop and implement forest management and other practices that minimize disturbances to SGCN (i.e., beyond their federal requirements).

11.2.1.5 Provide educational resources, training programs, and on-the-ground guidance to municipalities, state and federal agency resource managers on tasks such as writing and integrating Beach Management Plans into other management documents.

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

11.2.2 With private landowners

11.2.2.1 Provide technical support to farming operations and woodland landowners on ways to decrease clean farming (edge-to-edge) practices and create ecotones to benefit bobwhite and other species dependent on early successional habitat.

100 Law and Policy

100. Legislation

100.1.3 Sub-national Level

100.1.3.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.3.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.4 County and Local

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.3 Expand the acreages and enhance the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN through local ordinances.

100.1.4.4 Secure wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and biologically appropriate buffers through local ordinances.

100.1.4.5 Secure SGCN-inhabited/used freshwater wetlands and biologically appropriate buffers through local ordinances.

100.1.4.11 Secure riparian areas through local ordinances.

100.1.4.14 Adopt/pass local ordinances which require assessing and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.5.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.5.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into state/local policy to minimize the impact of aquaculture on fish and wildlife.

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100.1.5.5 Develop legislation to provide financial support for the New Jersey Invasive Species Strike Team.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.1 Develop (and/or improve) policies and/or regulations that will promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

100.3.0.5 Develop policies that will promote improved and secure habitat connections between conserved SGCN habitats.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.12 Develop policies that promote the preservation and protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.13 Develop policies that will promote protecting and restoring riparian areas.

100.3.0.14 Develop policies and/or regulations that increase the protective buffers of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) to biologically appropriate distances to benefit SGCN that rely upon these habitats and improve the function of the [associated] aquatic systems.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.23 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.26 Adopt regulations requiring the combined sewer overflow alternative analyses required by regulation address potential impacts to wildlife in watercourses or receiving water bodies.

100.3.0.31 Create or expand tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMPs.

100.3.0.32 Coordinate regulations across agencies to maximize availability of and enrollment in existing Forestry Stewardship Programs (e.g., "Woodland Stewards", Farm Bill, partners, etc.) to maintain and/or improve forest habitat.

100.3.0.38 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.3.0.39 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.3.0.40 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.45 Increase the controlled burn season to focus on restoring vegetative communities.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.48 Propose new State law or regulation mandating that a State-level "development impact fee" be assessed on all new development approved by municipalities (via the Municipal Land Use Law processes), and dedicate such monies to the development and implementation of regional Habitat Conservation Plans (or existing plans/programs serving the same regional function).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.53 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded rights-of-way corridors associated with energy transport/transmission.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.64 Develop regulations that when implemented will protect and restore riparian areas.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100.3.0.73 Develop regulations that would exempt the conversion of lawns to native vegetation (beneficial to wildlife) from local lawn ordinances.

100.3.2 State Land Acquisition Programs

100.3.2.1 Increase opportunities for habitat restoration by making any necessary policy changes to state, federal and local land acquisition programs (e.g., Green Acres, Blue Acres, etc.) to allow for acquisition within abandoned or failing bay shore communities, including mechanisms to relocate displaced people and infrastructure.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.2 Create a policy that requires the NJ DEP to incorporate scientific information regarding climate change and sea level rise (e.g., predictions, habitat management/acquisition efforts to enhance resilience to inundation) on their websites and to work with other government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

100.4.0.3 Develop policies for mandatory buffer strips on preserved farmlands and state-owned agricultural lands.

100.4.0.8 Develop a white paper addressing the impacts that existing, new or expanded rights-of-way have upon wildlife, wildlife habitats and habitat connectivity.

100.4.0.10 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.4.0.11 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.4.0.12 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.4.0.13 Develop policies for different circumstances (e.g., roadsides and medians, riparian, aquatic and terrestrial habitats) that outline appropriate habitat/vegetation management strategies and schedules to minimize risks to and benefit wildlife.

100.4.0.16 Develop policies to implement habitat management strategies that will increase the structural diversity surrounding areas used for energy, mining, and transportation and service corridors which include but are not limited to the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-

100.4.0.17 Develop policies to implement habitat management strategies, including prescribed burns, that will increase the structural diversity on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies to control and reduce the impacts of invasive, non-native species in order to increase structural habitat diversity.

100.4.0.18 Develop policies to minimize the extent of infrastructure associated with energy and service corridors or areas (e.g., wind and solar farms, pipelines, utility lines) and that require the implementation of habitat management strategies that will increase the structural diversity in the area including (e.g., the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides).

100.4.0.19 Develop regulations that will minimize the creation of new barriers, remove or replace current barriers with appropriately-sized systems to accommodate wildlife dispersal, and to minimize road widening and traffic volume increases within critical wildlife habitat areas.

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.21 Ensure that Section 303(d) of the Clean Water Act and applicable State statutory/regulatory requirements for surface water pollutant budgets are being met by monitoring and enforcing regulatory Total Maximum Daily Load (TMDL) targets established within regional Water Quality Management Plans.

100.4.0.22 Work with NJ DEP's Division of Land Use Regulation to ensure protection of listed species and their habitats during stream cleaning events.

100.4.0.24 Develop policies to provide financial support for the New Jersey Invasive Species Strike Team.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Septima's Clubtail

Focal species that comprise this Conservation Target:

Septima's Clubtail

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:

1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.1.1.2 Loss, alteration and/or degradation of habitat.

1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.1.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:

1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.2.1.2 Loss, alteration and/or degradation of habitat.

1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.2.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:

1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.3.1.2 Loss, alteration and/or degradation of habitat.

1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.3.1.6 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture (Avg. Score: 2.00)

NJ Specific Threats:

2.1.1.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.2 Small-holder Farming (Avg. Score: 1.00)

NJ Specific Threats: 2.1.2.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.2.2 Fragments terrestrial and aquatic habitats.

2.1.3 Agro-industry (Avg. Score: 1.00)

NJ Specific Threats: 2.1.3.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.3.2 Fragments terrestrial and aquatic habitats.

2.2 Wood and Pulp Plantations

2.2.1 Small Holder (Avg. Score: 1.00)

NJ Specific Threats: 2.2.1.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.2.2 Agro-industry Plantations (Avg. Score: 1.00)

NJ Specific Threats: 2.2.2.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.3 Livestock Farming and Ranching

2.3.2 Small-holder Grazing (Avg. Score: 1.00)

NJ Specific Threats: 2.3.2.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.2.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

2.3.2.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.2.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

2.3.3 Agro-industry Grazing (Avg. Score: 1.00)

NJ Specific Threats: 2.3.3.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.3.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

2.3.3.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.3.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

3 Energy Production and Mining

3.2 Mining and Quarrying

3.2.2 Surface Mining - Rock Quarry (and sand quarries) (Avg. Score: 1.00)

NJ Specific Threats: 3.2.2.1 Fragments terrestrial and aquatic habitats.

3.2.2.2 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

3.3 Renewable Energy

3.3.2 Solar Power (Avg. Score: 1.00)

NJ Specific Threats: 3.3.2.2 Loss, alteration and/or degradation of habitat.

3.4 Conventional Power Plants

3.4.0 Conventional Power Plants (Avg. Score: 1.00)

NJ Specific Threats: 3.4.0.3 Alteration of the temperature, pH and/or hydrology of aquatic ecosystems change plant communities and can harm wildlife and/or impact their behavior and survivorship.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.1.2 Movement of cars and other vehicles on roads and railroads (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 4.1.2.1 Increased vehicle traffic increases the risk of wildlife mortality from strikes.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads (Avg. Score: 1.00)

NJ Specific Threats: 4.2.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species, inhibiting dispersal of non-volant animals, reducing gene flow, and creating barriers to fish when service line-associated roads cross streams (e.g., bridges, culverts, fords, etc.).

4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

4.3 Shipping Lanes

4.3.2 Dredging impacts (Avg. Score: 2.00)

NJ Specific Threats: 4.3.2.1 Threatens wildlife by disrupting/removing stream bottom habitat.

5 Biological Resource Use

5.1 Hunting and Collecting Terrestrial Animals

5.1.1 Intentional Use (Avg. Score: 1.00)

NJ Specific Threats: 5.1.1.1 Illegal collection of wildlife can have detrimental impacts on populations.

5.4 Fishing and Harvesting of Aquatic Resources

5.4.4 Unintentional effects (large scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.4.4.1 Fish introduced for sport fishing can negatively impact native species by competing for resources and/or altering the habitat (e.g., disrupting benthic communities and/or severely impacting aquatic vegetation).

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized) (Avg. Score: 2.00)

NJ Specific Threats: 6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.

6.1.1.3 Increased risk of harassment that results in a change in wildlife behavior and/or direct mortality from vehicle strikes.

6.1.1.6 Off-road vehicles can be a mechanism of transference of wildlife diseases and invasive plant species if gear and apparel are not properly sanitized between sites.

7 Natural Systems Modifications

7.2 Dams and Water Management/Use

7.2.1 Abstraction of Surface Water (domestic use) (Avg. Score: 3.00)

NJ Specific Threats:
- 7.2.1.1 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.
- 7.2.1.2 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.
- 7.2.1.3 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, and eliminates shallow water habitats.

7.2.2 Abstraction of Surface Water (commercial use) (Avg. Score: 3.00)

NJ Specific Threats:
- 7.2.2.1 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, eliminates shallow water habitats, and disrupts/removes stream bottom habitat.
- 7.2.2.2 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.
- 7.2.2.3 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.3 Abstraction of Surface Water (agricultural use) (Avg. Score: 3.00)

NJ Specific Threats:
- 7.2.3.1 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.
- 7.2.3.2 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, and eliminates shallow water habitats.
- 7.2.3.3 Impounding water to create or expand bogs for cranberry farming leads to the loss of natural wetlands and the alteration of the natural hydrology in the area.
- 7.2.3.5 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.5 Abstraction of Ground Water (domestic use) (Avg. Score: 3.00)

NJ Specific Threats:
- 7.2.5.1 Heavy withdrawal of ground water for domestic use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.6 Abstraction of Ground Water (commercial use) (Avg. Score: 3.00)

NJ Specific Threats:
- 7.2.6.1 Heavy withdrawal of ground water for industrial and commercial use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.7 Abstraction of Ground Water (agricultural use) (Avg. Score: 3.00)

NJ Specific Threats:
- 7.2.7.1 Heavy withdrawal of ground water for agricultural use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.9 Small Dams (Avg. Score: 3.00)

NJ Specific Threats:
- 7.2.9.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.10 Large Dams (Avg. Score: 3.00)

NJ Specific Threats: 7.2.10.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.11 Dams (size unknown) (Avg. Score: 3.00)

NJ Specific Threats: 7.2.11.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.13 Stream Burial (Avg. Score: 3.00)

NJ Specific Threats: 7.2.13.1 Eliminates riparian habitats.

7.2.13.3 Alters the hydrology and quality of downstream aquatic and riparian habitats.

7.3 Other Ecosystem Modifications

7.3.3 Removal of coarse woody debris (streams, forests, scrub-shrub habitats) (Avg. Score: 1.00)

NJ Specific Threats: 7.3.3.1 Decreases the available detritus that normally accumulates behind and within stream obstructions, minimizing or eliminating food sources and shelters for fishes, invertebrates and amphibians.

7.3.3.2 Decreases habitat and/or corridor suitability due to limited or absent shelter and foraging habitat.

7.3.5 Poor habitat management (Avg. Score: 2.00)

NJ Specific Threats: 7.3.5.1 Improper or poorly scheduled maintenance of man-made corridors (e.g., roadsides and medians) can cause direct mortality to and may reduce productivity of wildlife.

7.3.5.2 Shifting from natural vegetation to lawns can cause increased temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

7.3.5.4 Vegetation clearing or inappropriate alteration adjacent to aquatic habitats threatens aquatic species by degrading habitat and water quality (altering temperature and dissolved oxygen, increasing siltation and desiccation, etc.).

7.3.5.9 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, eliminates shallow water habitats, and disrupts/removes stream bottom habitat.

7.3.5.10 Ditching, draining and filling of marshes and wetlands eliminates habitat and degrades the remaining surrounding areas for wildlife.

7.3.5.12 Lack of diversity in age structure and composition of vegetation due to lack of natural disturbances and/or vegetation management.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.1.1.1 Displace or outcompete native species for resources.

8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.

8.1.1.3 Invasive, non-native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

8.1.1.4 Invasive, non-native animals increase the risk of predation on native animals and/or herbivory on native vegetation.

8.1.1.5 Invasive, non-native animals and plants increase the risk of introduction and transference of diseases

8.1.1.6 Invasive, non-native plants may create physical barriers for some species.

8.1.5 Invasive non-native terrestrial/wetland plants (Avg. Score: 2.00)

NJ Specific Threats: 8.1.5.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.1 Domestic and Urban Waste Water

9.1.1 Sewage (Avg. Score: 3.00)

NJ Specific Threats: 9.1.1.1 Degradation of aquatic and marine water quality and habitats by changing turbidity, flow and water chemistry.

9.1.1.2 Leads to increased eutrophication and algae blooms that result in oxygen depletion.

9.1.1.3 Contaminants in sewage treatment effluents and Combined Sewer Overflows can cause developmental and behavioral abnormalities and reproductive failure in wildlife.

9.1.2 Run-off (Avg. Score: 3.00)

NJ Specific Threats: 9.1.2.1 Chemical fertilizers and nutrient run-off changes the pH in streams and ponds and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.1.2.2 Contaminants degrade aquatic and marine water quality and can bioaccumulate in benthic organisms, threatening wildlife by causing developmental and behavioral abnormalities and reproductive failure.

9.1.2.3 Contaminants from road runoff (oil, sediment, salt, etc.) impact native vegetation and the species that rely upon them, degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2 Industrial and Military Effluents

9.2.1 Oil Spills (Avg. Score: 3.00)

NJ Specific Threats: 9.2.1.1 Oil spills render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.1.2 Oil spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.1.3 Oil spills cause external oiling of wildlife and ingestion of oil, both of which can injure or kill wildlife.

9.2.2 Seepage from Mining (Avg. Score: 1.00)

NJ Specific Threats: 9.2.2.1 Contaminants from mining degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2.3 Other (Avg. Score: 3.00)

NJ Specific Threats: 9.2.3.1 Point and nonpoint source pollution such as polychlorinated biphenyls (PCBs), pesticides, heavy metals, and endocrine disrupting compounds (EDC's) into freshwater and marine systems pose threats to wildlife through direct contact and/or ingestion, and to aquatic species and their predators through bioaccumulation, impacting the reproductive success and neurological function of many avian and fish species.

9.2.3.2 Chemical spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.3.3 Chemical spills may render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.5 Other: Industrial toxic settling ponds (Avg. Score: 1.00)

NJ Specific Threats: 9.2.5.1 Surficial or open industrial effluent ponds can cause injury or death to wildlife that become exposed through ingestion or submersion.

9.3 Agricultural and Forestry Effluents

9.3.1 Nutrient Loads (Avg. Score: 3.00)

NJ Specific Threats: 9.3.1.1 Chemical fertilizers and nutrient run-off changes the pH in streams, ponds and wetlands and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.3.1.2 Animal waste degrades terrestrial and aquatic habitats, especially streams, ponds and wetlands, resulting in eutrophication, which disrupts oxygen and nutrient balances, and causes injury and mortality to aquatic organisms.

9.3.2 Soil Erosion and Sedimentation (Avg. Score: 3.00)

NJ Specific Threats: 9.3.2.1 Soil erosion, sedimentation and destruction of streambanks and riparian buffers degrade waters making them unsuitable for riparian-dependent wildlife.

9.3.3 Herbicides and Pesticides (Avg. Score: 3.00)

NJ Specific Threats: 9.3.3.1 Pesticides degrade terrestrial and aquatic habitats, especially streams, ponds and wetlands. Aquatic wildlife are particularly sensitive to these contaminants, which can cause developmental and behavioral abnormalities and reproductive failure. Some contaminants may bioaccumulate in predatory fish and birds and disrupt reproduction.

9.3.3.3 Use of pesticides can directly harm non-target species through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture (Avg. Score: 3.00)

NJ Specific Threats: 9.3.5.1 Use of pesticides, insecticides, and/or herbicides can directly harm non-target species, such as amphibians and beneficial invertebrates through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5.4 Improper use of current insecticides, such as those containing esfenvalerate, prallethrin, or piperonyl butoxide, or past use of pesticides containing chlordane still present in the soils, are toxic to various wildlife species, and can cause injury, mortality, or other effects that impair population viability.

9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.5 Air-Bourne Pollutants

9.5.1 Acid Rain (Avg. Score: 1.00)

NJ Specific Threats: 9.5.1.1 Causes acidification of water bodies, resulting in changes to aquatic and marine communities and reducing biodiversity, and creating conditions that are unsuitable for some aquatic (freshwater and marine) and semi-aquatic species that are sensitive to pH shifts.

9.5.4 Other (Avg. Score: 1.00)

NJ Specific Threats: 9.5.4.1 Dust and/or airborne sedimentation from construction sites, agricultural operations or related earth disturbances can introduce mineral or organic sediments into adjacent wildlife habitats, degrading their quality and suitability for wildlife short-term and/or long-term.

9.5.6 Herbicides and Pesticides (Avg. Score: 3.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

9.6 Excess Energy

9.6.2 Thermal Pollution (Avg. Score: 1.00)

NJ Specific Threats: 9.6.2.2 Water temperature changes to aquatic systems can deter or preclude use by SGCN (e.g., alter habitat suitability for wildlife species, reduce prey base) or present stressors that are harmful if not fatal to wildlife.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 3.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.2 Droughts

11.2.1 Droughts (Avg. Score: 3.00)

NJ Specific Threats: 11.2.1.1 Contribute to hardened soils, decreasing water recharge during rains and increasing the likelihood of flash floods during storms.

11.2.1.2 Lead to lower groundwater levels and therefore, less available water for people and habitats.

11.2.1.3 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

11.3 Temperature Extremes

11.3.1 Temperature extremes (Avg. Score: 1.00)

NJ Specific Threats: 11.3.1.1 Increasing temperatures may cause habitat loss and degradation by desiccating and/or raising the temperatures of small wetlands and streams leading to the loss of freshwater mussels and other aquatic species and species reliant upon these habitats.

11.3.1.2 Increased temperatures can negatively impact wetland, riverine, lacustrine and vernal pool-associated or -dependent wildlife by reducing flows, increasing water temperatures, lowering water levels and causing premature drying of vernal habitats.

11.3.1.3 Temperature extremes of surface water and air degrades marine habitats and ecosystems, threatening marine wildlife. Such extremes also disrupt offshore currents and migratory patterns, species' ranges, and/or impact communities/food chains, all of which further impact the ecosystem.

11.4 Storms and Flooding

11.4.1 Storms and flooding (Avg. Score: 3.00)

NJ Specific Threats: 11.4.1.1 Extreme storms and flooding events threaten aquatic and marine wildlife through habitat degradation and alteration, including alterations to off-shore or back-bay benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic and marine wildlife.

11.4.1.5 Storm damage can alter forest structure via blow-downs or micro-bursts, and can destroy bird nesting in the locales where the storms occur.

11.4.2 Increased rainfall (Avg. Score: 2.00)

NJ Specific Threats: 11.4.2.1 Extreme rain events threaten aquatic wildlife through habitat degradation and alteration, including alterations to benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic wildlife.

11.4.2.2 Extreme rain events can damage wildlife nesting and resting habitats, including impacts to avian eggs and chick and small mammal survivorship.

11.4.2.3 More frequent rain events can alter terrestrial and wetland vegetation communities as well as wetland hydrology, shifting wildlife community use.

11.6 Phenology Shifting or Alteration

11.6.3 Phenology shifts related to species redistribution (Avg. Score: 1.00)

NJ Specific Threats: 11.6.3.1 Shifts in timing of species migration, breeding and hibernation, and available food resources, as a result of wildlife range shifts driven by climate change.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 3.00)

NJ Specific Threats: 12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.2 Lack of up-to-date existing information (Avg. Score: 3.00)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.3 Need to answer research question (Avg. Score: 3.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.4 Need to develop new technique (Avg. Score: 3.00)

NJ Specific Threats: 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 1.00)

NJ Specific Threats: 12.3.0.1 Regulatory habitat protections within state land use regulations are spatially limited to specific geographic areas (e.g., Pinelands, Coastal Area) or geographic features (e.g., wetlands, streams) and so fail to protect critical habitats that exist outside of these regulated areas.

12.3.0.6 Certain geographic or habitat features, such as vernal pools and headwater wetlands or streams, may be too small, mischaracterized, or misidentified to benefit from regulatory protection.

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 1.00)

NJ Specific Threats: 12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.

12.4.0.5 Bureau of Forest Fire Management policy has traditionally implemented prescribed burns on State lands for the sole purpose of public safety (i.e., addressing hazard fuel reduction), missing opportunities to burn in a manner that would additionally manage habitat for ecological diversity.

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 3.00)

NJ Specific Threats:

14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 3.00)

NJ Specific Threats:

14.2.1.1 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various forest management practices.

14.2.1.2 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various aquatic and riparian management practices.

14.2.1.5 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various wetland management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 1.00)

NJ Specific Threats:

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.6 Secure and promote the protection/restoration of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers through incentive programs.

1.2.1.7 Secure and promote the protection/restoration of fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.9 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing Forestry Stewardship Programs.

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.12 Create incentives (non-monetary and/or monetary) for land developers to redevelop abandoned areas (e.g., shopping centers, office complexes) to minimize the loss of natural habitats and reduce the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.14 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of herbicides and pesticides, and implementing more ecologically safe strategies when using such products.

1.2.1.15 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of rodenticides, and implementing more ecologically safe strategies when using such products.

1.2.1.16 Create incentives (non-monetary and/or monetary) within State regulations (mitigations requirements or credit, BMP satisfaction, etc.) to promote the use of retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.17 Develop a public-relations oriented certification program for private retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.18 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and land managers to control and reduce the impacts of invasive, native and non-native species in order to increase structural habitat diversity.

1.2.1.19 Create incentives for federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to farmers, woodland landowners, and private landowners to adopt and/or endorse consistent BMPs concerning controlled burns to maintain and/or improve wildlife habitat.

1.2.1.20 Coordinate across government agencies and non-government organizations to create or expand upon tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMP's.

1.2.1.21 Create and/or support market-based programs that subsidize or create branding for products derived sustainably from managed wildlife habitats.

1.2.1.22 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to horse/livestock farm owners and managers to increase structural habitat diversity in and around the farms by managing vegetation for a variety of species, in particular, farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

1.2.1.23 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to provide cost shares and/or plan approvals for management based on management approaches and prescriptions.

1.2.1.24 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners, with habitat of suitable patch size to support breeding grassland-dependent species, to alter the timing of vegetation management to benefit grassland and pollinator species.

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

2 Direct Management of Natural Resources

2.3 Fire management

2.3.2 Fuel reduction

2.3.2.1 Prevent wildfires by reducing natural fuel (e.g., leaf litter).

2.3.3 Prescribed burning

2.3.3.1 Evaluate different management techniques of prescribed burns that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

2.3.3.2 Conduct prescribed burning in Northern New Jersey forests to maintain and regenerate a mosaic of upland forest habitats.

2.3.3.3 Conduct prescribed burning to improve wildlife habitat.

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.1 Control invasive insect infestations by implementing BMP strategies through biological, chemical and/or mechanical means that will depress, or when appropriate, eradicate populations in a manner that avoids excessive harm to non-target species using BMPs to control infestations and limit their spread based on an inventory of invasive insect distribution and response to outbreaks.

2.8.0.2 Develop, implement, monitor and evaluate pest control/management strategies to reduce the impacts of over-abundant wildlife species (native and/or native, invasive species) on native vegetation and the degradation of habitats supporting SGCN. Over-abundant wildlife species include but are not limited to mute swans, Canada geese, beaver and white-tailed deer.

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.5 Implement biologically safe and appropriate control/management strategies, and where appropriate, eradication strategies to reduce the impacts and/or limit the distribution of invasive and/or non-native plant species within or near aquatic systems using methods that will provide the most protection to the aquatic and riparian ecological system, and minimize disturbance to the soil and wildlife. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.8.0.6 Implement long-term management of invasive and/or non-native plants to help maintain functioning ecological systems and biological diversity, and to enhance travel corridors. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.2 Improve the availability of prey/food resources through terrestrial and aquatic plantings and habitat restoration for SGCN populations, in particular for those populations thought to be limited due wholly or in part to a lack of (or contaminated) food resources, and for migratory species (birds, bats, invertebrates).

2.10.0.3 Restore and/or enhance habitats to benefit urban-associated SGCN.

2.10.0.4 Restore and/or enhance suitable travel corridors connecting conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.8 Protect significant natural and/or unique communities by implementing best management practices when conducting habitat restoration strategies.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.10 Minimize the loss of important habitats (e.g., coastal scrub-shrub and grassy habitats, high and low marsh habitats, etc.) that provide nesting, migrating, and wintering areas for SGCN birds and other coastal and marsh-dependent species through habitat restoration efforts.

2.10.0.11 Restore and/or enhance critical migratory terrestrial and aquatic habitats (e.g., beach, grasslands, forest, scrub-shrub, etc.) for songbirds, raptors, shorebirds, waterfowl, bats and invertebrates through habitat restoration efforts and expand habitat restoration to adjacent private lands to increase the effective size of the habitat.

2.10.0.12 Create and/or maintain scrub-shrub habitats through revegetation efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.15 Restore and/or enhance terrestrial and aquatic habitats proximate to but not adjacent to roads and other transportation corridors for terrestrial-bound SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.10.0.21 Restore and/or enhance understory habitats that suppress invasive species and provide critical resources and enhance sheltering, foraging, and nesting cover for wildlife.

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.11.0.3 Create suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats through vegetation management.

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through vegetation management.

2.11.0.6 Reclaim degraded rare species habitats by conducting vegetation management needed to restore habitat value for the documented/target SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.8 Maintain, enhance and/or restore biologically appropriate buffers for SGCN-inhabited/used freshwater wetlands through vegetation management.

2.11.0.23 Implement appropriate habitat management actions in areas where natural disturbances, such as wildfire, have been precluded.

2.11.0.24 Conduct vegetation management adjacent to aquatic habitats following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.25 Conduct vegetation management along access roads following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.26 Conduct vegetation management along roadsides and medians, avoiding peak activity periods for wildlife, that enhances wildlife dispersal naturally and safely across roads and similar barriers to/between terrestrial and/or aquatic habitats.

2.11.0.27 Conduct vegetation management for target shrub- or young forest-dependent SGCN following BMPs to minimize the risk of the establishment of invasive and non-native plants.

2.11.0.28 Conduct vegetation management in agricultural areas following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.29 Conduct vegetation management on transportation and service corridors (i.e., rights-of-way) following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.30 Identify and prioritize areas where various management tools (such as increasing salinity through the management of water levels or chemical applications) may be effective in reducing phragmites within and restoring marsh habitat.

2.11.0.31 In areas where vegetative communities are shifting due to fire suppression and controlled burns are not feasible, manage vegetation to improve wildlife habitat.

2.11.0.32 Increase structural habitat diversity around and when feasible, within agricultural landscapes by managing vegetation for a variety of species, in particular, those farms that have removed scrub-shrub habitat and/or fragmented forests, and by implementing ecologically best practices (e.g., no-till farming, maintaining hedgerows, buffer set-asides, etc.).

2.11.0.33 Increase structural habitat diversity by implementing long-term vegetation management to minimize the potential for the establishment of invasive and/or non-native plants that may outcompete native vegetation.

2.11.0.34 Increase structural habitat diversity by managing residential, commercial and recreational areas' landscapes for a variety of species. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.35 Increase structural habitat diversity by managing vegetation adjacent to aquatic habitats in a manner that provides a buffer from runoff and erosion and a microclimate to stabilize seasonal temperatures to benefit a variety of aquatic and semi-aquatic species.

2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.

2.11.0.38 Increase structural habitat diversity in and around horse/livestock farms by managing vegetation for a variety of species, in particular, in and around farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

2.11.0.39 Increase structural habitat diversity in and around solar farms by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.40 Increase structural habitat diversity surrounding areas used for energy, mining, and transportation and service corridors by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides, and avoid managing habitat during the breeding seasons for ground-nesting birds, reptiles, amphibians and small mammals.

2.11.0.41 Increase structural habitat diversity through the implementation of a variety of vegetation management practices such a prescribed burns (either increasing or decreasing their frequency depending on the site and objective), plantings, etc. that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.42 Increase structural habitat diversity within wind farms for terrestrial bound and low-flying species and around wind farms for other wildlife by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.43 Manage forests to increase variation in age structure and composition using BMPs that promote and maintain functioning ecological forest-based systems and biological diversity.

2.11.0.45 Regularly and/or rotationally create young forest habitat in targeted areas to maintain and regenerate a mosaic of upland forest habitats that will benefit shrub- and young forest-dependent species.

2.12 Water management

2.12.1 Ditch plugs

2.12.1.1 Implement best management practices (BMPs), protective strategies, and guidelines for ditch plugging to maintain and enhance healthy, resident and migratory SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.12.3 Drainage

2.12.3.2 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) such as removing drainage ditches to restore natural stream flows and wetlands, that benefit wildlife inhabiting these areas.

2.12.3.3 Remove tile drains and drainage ditches to improve wetland hydrology and restore natural stream flows during appropriate times to avoid sensitive periods (e.g., nesting, denning, roosting) and minimizes harm to wildlife, particularly SGCN.

2.12.3.4 Expand the acreages and enhance the effective size of SGCN habitats by reclaiming/restoring adjacent, degraded habitats by removing tile drains and drainage ditches.

2.12.3.5 Remove drainage ditches adjacent to roads to decrease the attraction for amphibians, reptiles and small mammals, and thereby minimizing road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.12.3.6 Protect significant natural and/or unique communities by and when removing tile drains and drainage ditches.

2.12.3.7 Minimize habitat loss of critical coastal habitats that provide nesting, migrating, and wintering areas for birds and other coastal species by maintaining or enhancing these areas by removing drainage ditches.

2.12.3.8 Enhance critical migratory stopover beach habitats for songbirds, raptors, shorebirds, bats and invertebrates by removing drainage ditches and expanding management to adjacent private lands to increase the effective size of the habitat.

2.12.3.9 Implement drain removal on state and other conservation lands to enhance food availability for migratory species (birds, bats, invertebrates).

2.12.3.10 Use tile drain and drainage ditch removal to create feeding and roosting habitats for migratory species (shorebirds, raptors, bats, songbirds and invertebrates) in appropriate areas along documented migratory corridors around the State.

2.12.3.11 Implement best management practices (BMPs), protective strategies, and guidelines when removing tile drains and drainage ditches to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.13 Wildlife damage management

2.13.0 Nuisance fish and wildlife damage

2.13.0.4 Investigate the effects of mosquito control methods on freshwater aquatic and semi-aquatic SGCN including but not limited to, amphibian, fish, dragonfly, and damselfly populations.

2.14 Wildlife disease management

2.14.0 Wildlife disease strategy development and investigation

2.14.0.1 Investigate diseases/pathogens impacting SGCN and/or their habitats.

2.14.0.2 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

2.14.0.3 Protect SGCN from exotic pathogen introduction or incident through implementation of a "rapid response plan"; DFW to give priority attention to these species in planning and/or implementing a response.

2.14.0.4 Conduct long-term monitoring of diseases in vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts.

2.14.0.5 Assess the impacts of diseases on the life cycles of wildlife.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.14 Identify areas with invasive, aquatic plants and animals and collect a detailed baseline assessment of the species' status and distribution. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort. Researchers and contractors performing Forest Stewardship Inventories and/or Plans on state lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.0.0.15 Conduct long-term monitoring of areas identified as having invasive, aquatic plants and animals to track the species' status/progress over time with or without the implementation of management strategies. Areas without management strategies should be assessed and prioritized for management/control. Areas where management strategies are being implemented should include an assessment of the management effort and identify/recommend and implement necessary changes to improve its success. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort.

3.0.0.19 Identify the presence and status (e.g., functioning, structure, slated for removal, etc.) of existing dams and culverts within and/or that may impact SGCN and their habitats, and create a database that includes a GIS component identifying the locations of such structures and their status. Share this information with appropriate organizations and/or agencies evaluating the benefits and risks of such structures on SGCN and their habitats.

3.0.0.20 Once baseline data identifying and describing the status of existing dams and culverts have been gathered, conduct evaluations at a variety of sites to determine whether the benefits of culvert and dam creation or removal outweigh the risks to SGCN species and their habitats, and if other variables/conditions specific to individual sites/locations result in a different outcome. Identify and target appropriate dams and culverts for removal and/or reconstruction to minimize harm to SGCN species and their habitats.

3.0.0.23 Identify (through wildlife and aquatic system surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and research water quality parameters for all [types of] aquatic systems for various SGCN populations.

3.0.0.26 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species including objectives and guidance pertaining to and the condition/status of critical and supporting habitats.

3.0.0.27 Evaluate the effectiveness of strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals through research and monitoring. Develop and provide NJ DEP and other appropriate governing agencies/commissions a summary of findings and recommendations to improve such efforts.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.3 Survey for and monitor populations of freshwater aquatic focal SGCN to assess the populations' demography, trends, condition, distribution, etc.

3.2.0.7 Track (via a database that includes a GIS component) and research problematic species and diseases to determine their distribution, impacts on SGCN wildlife/wildlife communities, and develop potential control measures.

3.2.0.8 Implement and conduct long-term monitoring of control measures aimed at minimizing the impacts of problematic species and/or diseases to evaluate the effectiveness of such efforts and to identify and incorporate additional strategies as appropriate.

3.2.0.18 Conduct baseline surveys/inventories to better understand the distribution of fish and invertebrate (including freshwater mussels) populations.

3.2.0.21 Investigate the effects of mosquito control methods on freshwater aquatic and semi-aquatic SGCN including but not limited to, amphibian, fish, dragonfly, and damselfly populations.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.2 Age, size and sex structure

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.3 Baseline inventory

3.2.3.9 Investigate hazardous environmental issues that may impact grassland invertebrates.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.6 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) that could, through revegetation and/or enhancement efforts, become suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN.

3.3.1.7 Map and prioritize existing and potential areas for early succession forest management. Share the results with state, county and municipal planners.

3.3.1.9 Inventory forests throughout northern New Jersey to develop a baseline characterization of the structure and composition of habitats and identify deficient forest habitat types.

3.3.1.10 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and document fish SGCN habitats by plotting their distributions in GIS and submitting the data to the State for integration into the DEP's Biotics database.

3.3.1.16 Gather "best information" for spatial modeling and update/create a current model/depiction of anticipated habitat shifts from sea-level rise, flooding, etc.

3.3.1.17 Identify and map undeveloped roads and trails in all conserved forests, and create a database of locations. Integrate information regarding potentially sensitive areas.

3.3.1.18 Conduct an assessment using available data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels.

3.3.1.19 Identify and codify legal ORV access areas on state (and if appropriate, other conserved) lands. Provide GIS mapping to the landowner for potential use in directing such recreational activities.

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.1.26 Survey all historic locations and unsurveyed suitable habitats to identify populations of freshwater aquatic focal species.

3.3.2 Monitoring

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.4 Protect water quality and aquatic-dependent species by appropriately designating Category 1 waters and enforcing protective regulations. Seek appropriate classifications for stream segments based on Endangered and Threatened Status and/or the Index of Biotic Integrity (IBI) results that do not fulfill Category One requirements.

3.3.2.5 Conduct long-term monitoring of water quality of SGCN aquatic habitats (and aquatic systems feeding into those habitats) to evaluate protection and management efforts to reduce, if not eliminate, chemical contamination, siltation, eutrophication, and other forms of pollution/contamination of aquatic systems.

3.3.2.10 Evaluate the efficacy and success of different management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.3.2.14 Research and evaluate the effectiveness of water quality management practices on water-dependent and semi-dependent SGCN, particularly those practices associated with permitting or mitigation actions.

3.3.2.15 Investigate the effectiveness of management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.3.2.20 Once a system is developed for reporting and qualifying new locations of invasive species, develop, implement and monitor/evaluate invasive species removal strategies at identified locations. Priority should be given to those areas critical to SGCN and/or contain unique and/or rare plant communities supporting SGCN and/or other fish/wildlife species.

3.3.2.24 Conduct regular inventories of forests throughout northern New Jersey to characterize the changing structure and composition of habitats and monitor forest conditions.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.3 Develop/improve management techniques that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.8 Develop best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5.3.9 Develop strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.14 Develop aquaculture practices in the coastal areas that are compatible with the recovery of SGCN.

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.3.16 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.3.21 Develop management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.23 Revise water quality management practices based on research on water-dependent and semi-dependent SGCN, particularly when associated with permitting or mitigation actions.

3.5.3.24 Based on research, modify management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.4 Investigate the effects of mosquito control methods on freshwater aquatic and semi-aquatic SGCN including but not limited to, amphibian, fish, dragonfly, and damselfly populations.

3.5.4.5 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

3.5.4.6 Investigate the feasibility of mitigating for the impacts of contaminants to vulnerable wildlife, particularly SGCN. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.5.4.14 Develop and implement agreements, and update existing agreements, with government agencies regarding the protection of critical SGCN habitats (e.g., significant breeding populations of beach nesting birds, colonial waterbird nesting areas, bat colonies, etc.).

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.18 Investigate the effectiveness of survey techniques through selected “ground truthing” and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

3.5.4.21 Develop BMPs to address problematic species and diseases of unknown origin.

4 Education

4.1 Educator/Instructor training

4.1.0 Public education

4.1.0.1 Provide educational resources and training programs to private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

5 Facilities and Areas

5.15 Wildlife Management Areas

5.15.6 Roads

5.15.6.1 Clearly post areas/roads where vehicle access is permitted.

5.15.6.2 Clearly post areas/trails where vehicle access is not permitted.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.3 Secure and protect riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.7 Secure and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.3 Increase the protection of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through conservation area designations.

7 Law Enforcement

7.1 Law enforcement

7.1.3 Sub-national Level

7.1.3.2 Increase the number of law enforcement officers tending to wildlife issues to a reasonable number to sufficiently cover the State and marine waters.

7.1.4 Scale Unspecified

7.1.4.1 Improve enforcement of policies and/or regulations that promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.16 Implement policies that protect and restore riparian areas.

7.1.4.17 Improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

7.1.4.26 Educate law enforcement personnel that there may be unauthorized research projects taking place and to encourage them to investigate any activities that appear to be harmful to wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.2 Develop a team of personnel from government entities, conservation organizations and other stakeholders engaged in oil/gas spill response for marine and freshwater habitats to develop a feasible plan for oil spill response and/or to amend NJ's current oil spill response plan that clearly outlines each organizations responsibilities and an assessment and location list of available equipment for boom deployment during oil spills.

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.1.0.4 Engage government agencies, conservation partners and other stakeholders in constructive dialogues encouraging them to influence policy change and the creation of incentives through a habitat bill and/or municipal ordinances for backyard habitat.

8.1.0.15 Engage government agencies, conservation partners and other stakeholders in discussions encouraging and supporting the creation of laws and policies requiring vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

8.1.0.16 Engage local governments in discussions regarding the importance of them adopting/passing ordinances which require assessing and addressing secondary impacts (i.e., ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

8.1.0.17 Engage municipalities in constructive dialogue to identify and minimize destruction of areas prioritized for early succession forest management.

8.1.0.18 Engage NJDOT, NJ Transit Authority and other road management entities, wildlife conservation organizations/agencies (e.g., Division of Fish and Wildlife, New Jersey Conservation Foundation, Conserve Wildlife Foundation of NJ), and communities and citizens in discussions regarding the importance of and methods to enhance habitat connectivity, and work together to develop feasible strategies for ensuring that wildlife can disperse naturally and safely across roads and similar barriers to terrestrial and/or aquatic habitats.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.20 Organize a small focal group of government and non-government agencies/organizations responsible for decisions regarding beach/dune management to share and coordinate their goals so that comprehensive planning can attempt to meet all needs.

8.1.0.21 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation human-subsidized and/or overabundant, native species cause to local nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.22 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation invasive species cause to native nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.26 Coordinate across federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to woodland landowners to adopt or endorse consistent best management practices concerning controlled burns to maintain and/or improve forested habitat for wildlife.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.33 Engage government agencies, conservation partners and other land managers, communities, landowners, and commercial and industrial stakeholders in discussions regarding the importance of protecting and methods to protect priority wetlands beyond the levels afforded through regulation by maintaining and/or restoring optimal biological buffers around wetlands.

8.1.0.34 Work with the NJ Education Association and Department of Education to design curriculum and outdoor experimental learning opportunities, and provide training to teachers on implementation of these activities.

8.1.0.37 Enlist landowners and NJ citizens in the protection of and survey efforts for SGCN, in particular rare species, by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management and wildlife-related volunteer programs.

8.1.0.38 Engage partners, stakeholders and land managers in constructive dialogue promoting forest stewardship for SGCN that use core forests and forested corridors.

8.1.0.40 Encourage researchers, land managers, naturalists and enthusiasts to follow proper procedures for the coordination and/or permitting of research/management activities involving wildlife and sensitive habitats, and discourage activities that alter vegetation or wetlands, or cause harm or disturbance to wildlife.

8.1.0.42 Engage citizens, wildlife observers and photographers through discussions and distributable information regarding the importance of and encouraging implementing responsible and ethical behavior when observing wildlife by developing an alliance of wildlife photographers and widely circulating recommendations on how to reduce impact.

8.1.0.44 Engage conservation partners, stakeholders, government agencies and other land stewards in constructive dialogues encouraging their inclusion of controlled burns in forest and other stewardship plans.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.1.0.48 Form cooperative partnerships with transportation and shipment agencies and companies to facilitate habitat creation and enhancement away from and outside of project areas and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.2 Recruitment and retention activities

8.2.3 For wildlife watching

8.2.3.1 Develop and implement nature-focused tourism opportunities including wildlife viewing sites, interpretive signage highlighting unique ecosystems/habitats, and wildlife-related recreational opportunities that do not negatively impact SGCN or their habitats.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.7 Develop and provide (or otherwise make publicly available) educational programs and/or materials that describe the negative impacts of off-road vehicles and watercraft use in and adjacent to critical SGCN habitats, and the importance of confining such activities to more appropriate locations and/or seasons.

8.3.0.8 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate recreationists and encourage landowners to eliminate garbage in the vicinity of suitable wildlife habitat, in particular SGCN habitat. Information should include the detrimental impacts garbage may have on various wildlife species.

8.3.0.9 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners and land managers to include only native plants in landscaping and restoration projects. Provide information to assist them in detecting problematic establishment of invasive, non-indigenous plants.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.11 Develop and provide (or otherwise make publicly available) educational programs and/or materials to the public, wildlife-related professionals, foresters, etc., that describe the value of species that are often feared (e.g., snakes, bats, spiders, Allegheny woodrat) and/or deemed a "nuisance" (e.g., squirrel, deer, snapping turtle), and therefore, persecuted by people. Include information on tolerance, proper identification, eviction from human dwellings, how to minimize the animal's presence on the property, and/or how to live in harmony with the animal.

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.24 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

8.3.0.25 Develop educational outreach programs for landowners, nurseries and the general public regarding the negative impacts of invasive and non-native plants on our natural communities.

8.3.0.26 Develop educational outreach programs for private and public landowners and land managers regarding the importance of and how to manage core forests and forested corridors in a way that will be beneficial for SGCN, particularly endangered, threatened and special concern species.

8.3.0.27 Develop educational outreach programs for public and private landowners and land managers regarding the importance of structural habitat diversity, methods to increase diversity, and/or incentive programs available to increase habitat diversity.

8.3.0.29 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about the importance of maintaining a vegetative buffer along riparian and aquatic habitats to intercept storm water runoff and minimize soil erosion.

8.3.0.30 Develop educational outreach programs for private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.5 Develop a plan that directs the creation or expansion of energy or utility rights-of-way in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.6 Develop a plan that directs the creation or expansion of roads and railroads or the re-establishment of abandoned railroads within and adjacent to critical forested habitats in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.7 Develop a plan that directs the maintenance of or new channelization of forested streams and rivers in a manner that minimizes impacts of the aquatic ecological system and adjacent forest

9.1.0.8 Develop a plan that focuses on strategies for oil pipelines to avoid sensitive habitats that would be highly impacted by oil spills.

9.1.0.9 Develop a plan that focuses on strategies to minimize the creation of renewable energy farms (e.g., solar, wind) and related infrastructures within and their impacts on forested habitats and the wildlife community.

9.1.0.10 Develop a plan that focuses on strategies to minimize the impacts of mining on critical forested habitats.

9.1.0.11 Develop a plan that focuses on strategies to minimize the impacts of power plants on critical forested habitats and the wildlife community.

9.1.0.13 Develop a plan to minimize agriculture that would result in groundwater withdrawal in critical forested areas.

9.1.0.14 Develop a plan to minimize development that would result in groundwater withdrawal in critical forested areas.

9.1.0.15 Develop a plan to minimize fragmentation of terrestrial and aquatic habitats by roads.

9.1.0.16 Develop a plan to minimize new lawnscapes and preserve natural vegetation within and adjacent to critical forest areas.

9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.31 Develop wetland restoration plans that consider the life history and needs of wildlife occupying targeted habitats.

9.1.0.32 Incorporate aquatic habitat connectivity and water quality/effluent standards into local and state aquaculture plans and BMPs.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.2 Organizational strategic and CMS planning

9.2.1 Organizational strategic and operational planning

9.2.1.1 Identify and codify legal ORV access areas on state lands.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.5 Develop response plans to address disease outbreaks within wildlife populations, in particular SGCN.

9.3.1.7 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.10 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.15 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.1.16 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3 Habitat management planning

9.3.3.5 Develop a management plan using forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

9.3.3.7 Develop a management plan to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

9.3.3.8 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.3.13 Develop a management plan that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas and prevents or ameliorates near-term impacts of climate change throughout the State, but in particular within the coastal and Delaware Bay areas.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.16 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.21 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.3.24 Develop a plan to improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

9.3.3.28 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.3.29 Develop habitat management plans aimed at reducing or eliminating negative impacts of ORVs.

9.3.3.32 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3.34 Include controlled burn prescriptions in forest and stewardship plans to improve wildlife habitat.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.3 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.12 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed solar farm projects to reduce habitat fragmentation and minimize impacts on wildlife.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.2.2 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.2.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into the environmental review process to help establish policies and plans that minimize the impact of aquaculture on fish and wildlife.

11.1.2.4 Review strategies for creating or enhancing connectivity (e.g., installing appropriately-sized wildlife passages) between wetlands to allow wildlife to disperse naturally and safely.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.2 Provide technical support to public and private landowners and land managers for controlling invasive, native and non-native plant species in order to increase structural habitat diversity.

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.7 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on the importance of maintaining habitat connectivity, minimizing fragmentation, and the use of CHANJ products to help them target areas for such planning.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.14 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters), and to enhance or restore biologically appropriate buffers.

11.2.0.15 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and landowners about the importance of retaining and in an effort to protect, create, enhance and/or restore vegetation along aquatic habitats.

11.2.0.17 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of vernal pools and the protection, enhancement and/or restoration of biologically appropriate buffers.

11.2.0.22 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

11.2.0.23 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to SGCN habitats to promote the protection and/or enhancement of those adjacent habitats to increase the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and that connect conserved SGCN habitats.

11.2.0.24 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers on how to manage vegetated roadside areas (e.g., mowing, brush-hogging, etc.) on a schedule that avoids peak activity periods for wildlife and therefore, minimizes harm.

11.2.0.25 Provide educational resources, training programs, and on-the-ground guidance to resource managers regarding the assessment of and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) related to residential and commercial development.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.1 Engage partners and stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.3 Provide educational resources, training programs, and on-the-ground guidance to DOD to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop and implement forest management and other practices that minimize disturbances to SGCN (i.e., beyond their federal requirements).

11.2.1.5 Provide educational resources, training programs, and on-the-ground guidance to municipalities, state and federal agency resource managers on tasks such as writing and integrating Beach Management Plans into other management documents.

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

11.2.2 With private landowners

11.2.2.1 Provide technical support to farming operations and woodland landowners on ways to decrease clean farming (edge-to-edge) practices and create ecotones to benefit bobwhite and other species dependent on early successional habitat.

100 Law and Policy

100. Legislation

100.1.3 Sub-national Level

100.1.3.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.3.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.4 County and Local

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.3 Expand the acreages and enhance the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN through local ordinances.

100.1.4.4 Secure wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and biologically appropriate buffers through local ordinances.

100.1.4.5 Secure SGCN-inhabited/used freshwater wetlands and biologically appropriate buffers through local ordinances.

100.1.4.11 Secure riparian areas through local ordinances.

100.1.4.14 Adopt/pass local ordinances which require assessing and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.5.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.5.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into state/local policy to minimize the impact of aquaculture on fish and wildlife.

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100.1.5.5 Develop legislation to provide financial support for the New Jersey Invasive Species Strike Team.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.1 Develop (and/or improve) policies and/or regulations that will promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

100.3.0.5 Develop policies that will promote improved and secure habitat connections between conserved SGCN habitats.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.12 Develop policies that promote the preservation and protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.13 Develop policies that will promote protecting and restoring riparian areas.

100.3.0.14 Develop policies and/or regulations that increase the protective buffers of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) to biologically appropriate distances to benefit SGCN that rely upon these habitats and improve the function of the [associated] aquatic systems.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.23 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.26 Adopt regulations requiring the combined sewer overflow alternative analyses required by regulation address potential impacts to wildlife in watercourses or receiving water bodies.

100.3.0.31 Create or expand tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMPs.

100.3.0.32 Coordinate regulations across agencies to maximize availability of and enrollment in existing Forestry Stewardship Programs (e.g., "Woodland Stewards", Farm Bill, partners, etc.) to maintain and/or improve forest habitat.

100.3.0.38 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.3.0.39 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.3.0.40 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.45 Increase the controlled burn season to focus on restoring vegetative communities.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.48 Propose new State law or regulation mandating that a State-level "development impact fee" be assessed on all new development approved by municipalities (via the Municipal Land Use Law processes), and dedicate such monies to the development and implementation of regional Habitat Conservation Plans (or existing plans/programs serving the same regional function).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.53 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded rights-of-way corridors associated with energy transport/transmission.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.64 Develop regulations that when implemented will protect and restore riparian areas.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100.3.0.73 Develop regulations that would exempt the conversion of lawns to native vegetation (beneficial to wildlife) from local lawn ordinances.

100.3.2 State Land Acquisition Programs

100.3.2.1 Increase opportunities for habitat restoration by making any necessary policy changes to state, federal and local land acquisition programs (e.g., Green Acres, Blue Acres, etc.) to allow for acquisition within abandoned or failing bay shore communities, including mechanisms to relocate displaced people and infrastructure.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.2 Create a policy that requires the NJ DEP to incorporate scientific information regarding climate change and sea level rise (e.g., predictions, habitat management/acquisition efforts to enhance resilience to inundation) on their websites and to work with other government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

100.4.0.3 Develop policies for mandatory buffer strips on preserved farmlands and state-owned agricultural lands.

100.4.0.8 Develop a white paper addressing the impacts that existing, new or expanded rights-of-way have upon wildlife, wildlife habitats and habitat connectivity.

100.4.0.10 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.4.0.11 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.4.0.12 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.4.0.13 Develop policies for different circumstances (e.g., roadsides and medians, riparian, aquatic and terrestrial habitats) that outline appropriate habitat/vegetation management strategies and schedules to minimize risks to and benefit wildlife.

100.4.0.16 Develop policies to implement habitat management strategies that will increase the structural diversity surrounding areas used for energy, mining, and transportation and service corridors which include but are not limited to the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-

100.4.0.17 Develop policies to implement habitat management strategies, including prescribed burns, that will increase the structural diversity on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies to control and reduce the impacts of invasive, non-native species in order to increase structural habitat diversity.

100.4.0.18 Develop policies to minimize the extent of infrastructure associated with energy and service corridors or areas (e.g., wind and solar farms, pipelines, utility lines) and that require the implementation of habitat management strategies that will increase the structural diversity in the area including (e.g., the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides).

100.4.0.19 Develop regulations that will minimize the creation of new barriers, remove or replace current barriers with appropriately-sized systems to accommodate wildlife dispersal, and to minimize road widening and traffic volume increases within critical wildlife habitat areas.

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.21 Ensure that Section 303(d) of the Clean Water Act and applicable State statutory/regulatory requirements for surface water pollutant budgets are being met by monitoring and enforcing regulatory Total Maximum Daily Load (TMDL) targets established within regional Water Quality Management Plans.

100.4.0.22 Work with NJ DEP's Division of Land Use Regulation to ensure protection of listed species and their habitats during stream cleaning events.

100.4.0.24 Develop policies to provide financial support for the New Jersey Invasive Species Strike Team.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Superb Jewelwing

Focal species that comprise this Conservation Target:

Superb Jewelwing

Threats and Action Drivers associated with this Conservation Target:

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:

1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.1.1.2 Loss, alteration and/or degradation of habitat.

1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.1.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale) (Avg. Score: 3.00)

NJ Specific Threats:

1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.2.1.2 Loss, alteration and/or degradation of habitat.

1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.2.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale) (Avg. Score: 2.00)

NJ Specific Threats:

1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.3.1.2 Loss, alteration and/or degradation of habitat.

1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.3.1.6 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture (Avg. Score: 2.00)

NJ Specific Threats:

2.1.1.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.2 Small-holder Farming (Avg. Score: 1.00)

NJ Specific Threats: 2.1.2.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.2.2 Fragments terrestrial and aquatic habitats.

2.1.3 Agro-industry (Avg. Score: 1.00)

NJ Specific Threats: 2.1.3.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.3.2 Fragments terrestrial and aquatic habitats.

2.2 Wood and Pulp Plantations

2.2.1 Small Holder (Avg. Score: 1.00)

NJ Specific Threats: 2.2.1.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.2.2 Agro-industry Plantations (Avg. Score: 1.00)

NJ Specific Threats: 2.2.2.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.3 Livestock Farming and Ranching

2.3.2 Small-holder Grazing (Avg. Score: 1.00)

NJ Specific Threats: 2.3.2.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.2.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

2.3.2.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.2.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

2.3.3 Agro-industry Grazing (Avg. Score: 1.00)

NJ Specific Threats: 2.3.3.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.3.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

2.3.3.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.3.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

3 Energy Production and Mining

3.2 Mining and Quarrying

3.2.2 Surface Mining - Rock Quarry (and sand quarries) (Avg. Score: 1.00)

NJ Specific Threats: 3.2.2.1 Fragments terrestrial and aquatic habitats.

3.2.2.2 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

3.3 Renewable Energy

3.3.2 Solar Power (Avg. Score: 1.00)

NJ Specific Threats: 3.3.2.2 Loss, alteration and/or degradation of habitat.

3.4 Conventional Power Plants

3.4.0 Conventional Power Plants (Avg. Score: 1.00)

NJ Specific Threats: 3.4.0.3 Alteration of the temperature, pH and/or hydrology of aquatic ecosystems change plant communities and can harm wildlife and/or impact their behavior and survivorship.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.1.2 Movement of cars and other vehicles on roads and railroads (large and small scale) (Avg. Score: 1.00)

NJ Specific Threats: 4.1.2.1 Increased vehicle traffic increases the risk of wildlife mortality from strikes.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads (Avg. Score: 1.00)

NJ Specific Threats: 4.2.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species, inhibiting dispersal of non-volant animals, reducing gene flow, and creating barriers to fish when service line-associated roads cross streams (e.g., bridges, culverts, fords, etc.).

4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

4.3 Shipping Lanes

4.3.2 Dredging impacts (Avg. Score: 2.00)

NJ Specific Threats: 4.3.2.1 Threatens wildlife by disrupting/removing stream bottom habitat.

5 Biological Resource Use

5.1 Hunting and Collecting Terrestrial Animals

5.1.1 Intentional Use (Avg. Score: 1.00)

NJ Specific Threats: 5.1.1.1 Illegal collection of wildlife can have detrimental impacts on populations.

5.4 Fishing and Harvesting of Aquatic Resources

5.4.4 Unintentional effects (large scale) (Avg. Score: 1.00)

NJ Specific Threats: 5.4.4.1 Fish introduced for sport fishing can negatively impact native species by competing for resources and/or altering the habitat (e.g., disrupting benthic communities and/or severely impacting aquatic vegetation).

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized) (Avg. Score: 2.00)

NJ Specific Threats: 6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.

6.1.1.3 Increased risk of harassment that results in a change in wildlife behavior and/or direct mortality from vehicle strikes.

6.1.1.6 Off-road vehicles can be a mechanism of transference of wildlife diseases and invasive plant species if gear and apparel are not properly sanitized between sites.

7 Natural Systems Modifications

7.2 Dams and Water Management/Use

7.2.1 Abstraction of Surface Water (domestic use) (Avg. Score: 3.00)

NJ Specific Threats:

7.2.1.1 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.1.2 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.1.3 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, and eliminates shallow water habitats.

7.2.2 Abstraction of Surface Water (commercial use) (Avg. Score: 3.00)

NJ Specific Threats:

7.2.2.1 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, eliminates shallow water habitats, and disrupts/removes stream bottom habitat.

7.2.2.2 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.2.3 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.3 Abstraction of Surface Water (agricultural use) (Avg. Score: 3.00)

NJ Specific Threats:

7.2.3.1 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.3.2 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, and eliminates shallow water habitats.

7.2.3.3 Impounding water to create or expand bogs for cranberry farming leads to the loss of natural wetlands and the alteration of the natural hydrology in the area.

7.2.3.5 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.5 Abstraction of Ground Water (domestic use) (Avg. Score: 3.00)

NJ Specific Threats:

7.2.5.1 Heavy withdrawal of ground water for domestic use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.6 Abstraction of Ground Water (commercial use) (Avg. Score: 3.00)

NJ Specific Threats:

7.2.6.1 Heavy withdrawal of ground water for industrial and commercial use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.7 Abstraction of Ground Water (agricultural use) (Avg. Score: 3.00)

NJ Specific Threats:

7.2.7.1 Heavy withdrawal of ground water for agricultural use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.9 Small Dams (Avg. Score: 3.00)

NJ Specific Threats:

7.2.9.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.10 Large Dams (Avg. Score: 3.00)

NJ Specific Threats: 7.2.10.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.11 Dams (size unknown) (Avg. Score: 3.00)

NJ Specific Threats: 7.2.11.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.13 Stream Burial (Avg. Score: 3.00)

NJ Specific Threats: 7.2.13.1 Eliminates riparian habitats.

7.2.13.3 Alters the hydrology and quality of downstream aquatic and riparian habitats.

7.3 Other Ecosystem Modifications

7.3.3 Removal of coarse woody debris (streams, forests, scrub-shrub habitats) (Avg. Score: 1.00)

NJ Specific Threats: 7.3.3.1 Decreases the available detritus that normally accumulates behind and within stream obstructions, minimizing or eliminating food sources and shelters for fishes, invertebrates and amphibians.

7.3.3.2 Decreases habitat and/or corridor suitability due to limited or absent shelter and foraging habitat.

7.3.5 Poor habitat management (Avg. Score: 2.00)

NJ Specific Threats: 7.3.5.1 Improper or poorly scheduled maintenance of man-made corridors (e.g., roadsides and medians) can cause direct mortality to and may reduce productivity of wildlife.

7.3.5.2 Shifting from natural vegetation to lawns can cause increased temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

7.3.5.4 Vegetation clearing or inappropriate alteration adjacent to aquatic habitats threatens aquatic species by degrading habitat and water quality (altering temperature and dissolved oxygen, increasing siltation and desiccation, etc.).

7.3.5.9 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, eliminates shallow water habitats, and disrupts/removes stream bottom habitat.

7.3.5.10 Ditching, draining and filling of marshes and wetlands eliminates habitat and degrades the remaining surrounding areas for wildlife.

7.3.5.12 Lack of diversity in age structure and composition of vegetation due to lack of natural disturbances and/or vegetation management.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species (Avg. Score: 1.00)

NJ Specific Threats: 8.1.1.1 Displace or outcompete native species for resources.

8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.

8.1.1.3 Invasive, non-native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

8.1.1.4 Invasive, non-native animals increase the risk of predation on native animals and/or herbivory on native vegetation.

8.1.1.5 Invasive, non-native animals and plants increase the risk of introduction and transference of diseases

8.1.1.6 Invasive, non-native plants may create physical barriers for some species.

8.1.5 Invasive non-native terrestrial/wetland plants (Avg. Score: 2.00)

NJ Specific Threats: 8.1.5.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases (Avg. Score: 1.00)

NJ Specific Threats: 8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

9 Pollution

9.1 Domestic and Urban Waste Water

9.1.1 Sewage (Avg. Score: 3.00)

NJ Specific Threats: 9.1.1.1 Degradation of aquatic and marine water quality and habitats by changing turbidity, flow and water chemistry.

9.1.1.2 Leads to increased eutrophication and algae blooms that result in oxygen depletion.

9.1.1.3 Contaminants in sewage treatment effluents and Combined Sewer Overflows can cause developmental and behavioral abnormalities and reproductive failure in wildlife.

9.1.2 Run-off (Avg. Score: 3.00)

NJ Specific Threats: 9.1.2.1 Chemical fertilizers and nutrient run-off changes the pH in streams and ponds and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.1.2.2 Contaminants degrade aquatic and marine water quality and can bioaccumulate in benthic organisms, threatening wildlife by causing developmental and behavioral abnormalities and reproductive failure.

9.1.2.3 Contaminants from road runoff (oil, sediment, salt, etc.) impact native vegetation and the species that rely upon them, degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2 Industrial and Military Effluents

9.2.1 Oil Spills (Avg. Score: 3.00)

NJ Specific Threats: 9.2.1.1 Oil spills render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.1.2 Oil spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.1.3 Oil spills cause external oiling of wildlife and ingestion of oil, both of which can injure or kill wildlife.

9.2.2 Seepage from Mining (Avg. Score: 1.00)

NJ Specific Threats: 9.2.2.1 Contaminants from mining degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.2.3 Other (Avg. Score: 3.00)

NJ Specific Threats: 9.2.3.1 Point and nonpoint source pollution such as polychlorinated biphenyls (PCBs), pesticides, heavy metals, and endocrine disrupting compounds (EDC's) into freshwater and marine systems pose threats to wildlife through direct contact and/or ingestion, and to aquatic species and their predators through bioaccumulation, impacting the reproductive success and neurological function of many avian and fish species.

9.2.3.2 Chemical spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.3.3 Chemical spills may render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.5 Other: Industrial toxic settling ponds (Avg. Score: 1.00)

NJ Specific Threats: 9.2.5.1 Surficial or open industrial effluent ponds can cause injury or death to wildlife that become exposed through ingestion or submersion.

9.3 Agricultural and Forestry Effluents

9.3.1 Nutrient Loads (Avg. Score: 3.00)

NJ Specific Threats: 9.3.1.1 Chemical fertilizers and nutrient run-off changes the pH in streams, ponds and wetlands and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.3.1.2 Animal waste degrades terrestrial and aquatic habitats, especially streams, ponds and wetlands, resulting in eutrophication, which disrupts oxygen and nutrient balances, and causes injury and mortality to aquatic organisms.

9.3.2 Soil Erosion and Sedimentation (Avg. Score: 3.00)

NJ Specific Threats: 9.3.2.1 Soil erosion, sedimentation and destruction of streambanks and riparian buffers degrade waters making them unsuitable for riparian-dependent wildlife.

9.3.3 Herbicides and Pesticides (Avg. Score: 3.00)

NJ Specific Threats: 9.3.3.1 Pesticides degrade terrestrial and aquatic habitats, especially streams, ponds and wetlands. Aquatic wildlife are particularly sensitive to these contaminants, which can cause developmental and behavioral abnormalities and reproductive failure. Some contaminants may bioaccumulate in predatory fish and birds and disrupt reproduction.

9.3.3.3 Use of pesticides can directly harm non-target species through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture (Avg. Score: 3.00)

NJ Specific Threats: 9.3.5.1 Use of pesticides, insecticides, and/or herbicides can directly harm non-target species, such as amphibians and beneficial invertebrates through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5.4 Improper use of current insecticides, such as those containing esfenvalerate, prallethrin, or piperonyl butoxide, or past use of pesticides containing chlordane still present in the soils, are toxic to various wildlife species, and can cause injury, mortality, or other effects that impair population viability.

9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.5 Air-Bourne Pollutants

9.5.1 Acid Rain (Avg. Score: 1.00)

NJ Specific Threats: 9.5.1.1 Causes acidification of water bodies, resulting in changes to aquatic and marine communities and reducing biodiversity, and creating conditions that are unsuitable for some aquatic (freshwater and marine) and semi-aquatic species that are sensitive to pH shifts.

9.5.4 Other (Avg. Score: 1.00)

NJ Specific Threats: 9.5.4.1 Dust and/or airborne sedimentation from construction sites, agricultural operations or related earth disturbances can introduce mineral or organic sediments into adjacent wildlife habitats, degrading their quality and suitability for wildlife short-term and/or long-term.

9.5.6 Herbicides and Pesticides (Avg. Score: 3.00)

NJ Specific Threats: 9.5.6.1 May result in injury or direct mortality of non-target species.

9.6 Excess Energy

9.6.2 Thermal Pollution (Avg. Score: 1.00)

NJ Specific Threats: 9.6.2.2 Water temperature changes to aquatic systems can deter or preclude use by SGCN (e.g., alter habitat suitability for wildlife species, reduce prey base) or present stressors that are harmful if not fatal to wildlife.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations (Avg. Score: 3.00)

NJ Specific Threats: 11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.2 Droughts

11.2.1 Droughts (Avg. Score: 3.00)

NJ Specific Threats: 11.2.1.1 Contribute to hardened soils, decreasing water recharge during rains and increasing the likelihood of flash floods during storms.

11.2.1.2 Lead to lower groundwater levels and therefore, less available water for people and habitats.

11.2.1.3 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

11.3 Temperature Extremes

11.3.1 Temperature extremes (Avg. Score: 1.00)

NJ Specific Threats: 11.3.1.1 Increasing temperatures may cause habitat loss and degradation by desiccating and/or raising the temperatures of small wetlands and streams leading to the loss of freshwater mussels and other aquatic species and species reliant upon these habitats.

11.3.1.2 Increased temperatures can negatively impact wetland, riverine, lacustrine and vernal pool-associated or -dependent wildlife by reducing flows, increasing water temperatures, lowering water levels and causing premature drying of vernal habitats.

11.3.1.3 Temperature extremes of surface water and air degrades marine habitats and ecosystems, threatening marine wildlife. Such extremes also disrupt offshore currents and migratory patterns, species' ranges, and/or impact communities/food chains, all of which further impact the ecosystem.

11.4 Storms and Flooding

11.4.1 Storms and flooding (Avg. Score: 3.00)

NJ Specific Threats: 11.4.1.1 Extreme storms and flooding events threaten aquatic and marine wildlife through habitat degradation and alteration, including alterations to off-shore or back-bay benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic and marine wildlife.

11.4.1.5 Storm damage can alter forest structure via blow-downs or micro-bursts, and can destroy bird nesting in the locales where the storms occur.

11.4.2 Increased rainfall (Avg. Score: 2.00)

NJ Specific Threats: 11.4.2.1 Extreme rain events threaten aquatic wildlife through habitat degradation and alteration, including alterations to benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic wildlife.

11.4.2.2 Extreme rain events can damage wildlife nesting and resting habitats, including impacts to avian eggs and chick and small mammal survivorship.

11.4.2.3 More frequent rain events can alter terrestrial and wetland vegetation communities as well as wetland hydrology, shifting wildlife community use.

11.6 Phenology Shifting or Alteration

11.6.3 Phenology shifts related to species redistribution (Avg. Score: 1.00)

NJ Specific Threats: 11.6.3.1 Shifts in timing of species migration, breeding and hibernation, and available food resources, as a result of wildlife range shifts driven by climate change.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory (Avg. Score: 3.00)

NJ Specific Threats: 12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.2 Lack of up-to-date existing information (Avg. Score: 3.00)

NJ Specific Threats: 12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.3 Need to answer research question (Avg. Score: 3.00)

NJ Specific Threats: 12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.4 Need to develop new technique (Avg. Score: 3.00)

NJ Specific Threats: 12.1.4.1 Improve and evaluate survey methods for SGCN and their habitats; alter as needed.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms (Avg. Score: 1.00)

NJ Specific Threats: 12.3.0.1 Regulatory habitat protections within state land use regulations are spatially limited to specific geographic areas (e.g., Pinelands, Coastal Area) or geographic features (e.g., wetlands, streams) and so fail to protect critical habitats that exist outside of these regulated areas.

12.3.0.6 Certain geographic or habitat features, such as vernal pools and headwater wetlands or streams, may be too small, mischaracterized, or misidentified to benefit from regulatory protection.

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform (Avg. Score: 1.00)

NJ Specific Threats: 12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.

12.4.0.5 Bureau of Forest Fire Management policy has traditionally implemented prescribed burns on State lands for the sole purpose of public safety (i.e., addressing hazard fuel reduction), missing opportunities to burn in a manner that would additionally manage habitat for ecological diversity.

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats (Avg. Score: 3.00)

NJ Specific Threats:

14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions (Avg. Score: 3.00)

NJ Specific Threats:

14.2.1.1 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various forest management practices.

14.2.1.2 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various aquatic and riparian management practices.

14.2.1.5 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various wetland management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning (Avg. Score: 1.00)

NJ Specific Threats:

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Actions to address the Threats and Action Drivers associated with this Conservation Target:

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.6 Secure and promote the protection/restoration of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers through incentive programs.

1.2.1.7 Secure and promote the protection/restoration of fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.9 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing Forestry Stewardship Programs.

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.12 Create incentives (non-monetary and/or monetary) for land developers to redevelop abandoned areas (e.g., shopping centers, office complexes) to minimize the loss of natural habitats and reduce the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.14 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of herbicides and pesticides, and implementing more ecologically safe strategies when using such products.

1.2.1.15 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of rodenticides, and implementing more ecologically safe strategies when using such products.

1.2.1.16 Create incentives (non-monetary and/or monetary) within State regulations (mitigations requirements or credit, BMP satisfaction, etc.) to promote the use of retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.17 Develop a public-relations oriented certification program for private retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.18 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and land managers to control and reduce the impacts of invasive, native and non-native species in order to increase structural habitat diversity.

1.2.1.19 Create incentives for federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to farmers, woodland landowners, and private landowners to adopt and/or endorse consistent BMPs concerning controlled burns to maintain and/or improve wildlife habitat.

1.2.1.20 Coordinate across government agencies and non-government organizations to create or expand upon tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMP's.

1.2.1.21 Create and/or support market-based programs that subsidize or create branding for products derived sustainably from managed wildlife habitats.

1.2.1.22 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to horse/livestock farm owners and managers to increase structural habitat diversity in and around the farms by managing vegetation for a variety of species, in particular, farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

1.2.1.23 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to provide cost shares and/or plan approvals for management based on management approaches and prescriptions.

1.2.1.24 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners, with habitat of suitable patch size to support breeding grassland-dependent species, to alter the timing of vegetation management to benefit grassland and pollinator species.

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

2 Direct Management of Natural Resources

2.3 Fire management

2.3.2 Fuel reduction

2.3.2.1 Prevent wildfires by reducing natural fuel (e.g., leaf litter).

2.3.3 Prescribed burning

2.3.3.1 Evaluate different management techniques of prescribed burns that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

2.3.3.2 Conduct prescribed burning in Northern New Jersey forests to maintain and regenerate a mosaic of upland forest habitats.

2.3.3.3 Conduct prescribed burning to improve wildlife habitat.

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.1 Control invasive insect infestations by implementing BMP strategies through biological, chemical and/or mechanical means that will depress, or when appropriate, eradicate populations in a manner that avoids excessive harm to non-target species using BMPs to control infestations and limit their spread based on an inventory of invasive insect distribution and response to outbreaks.

2.8.0.2 Develop, implement, monitor and evaluate pest control/management strategies to reduce the impacts of over-abundant wildlife species (native and/or native, invasive species) on native vegetation and the degradation of habitats supporting SGCN. Over-abundant wildlife species include but are not limited to mute swans, Canada geese, beaver and white-tailed deer.

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.5 Implement biologically safe and appropriate control/management strategies, and where appropriate, eradication strategies to reduce the impacts and/or limit the distribution of invasive and/or non-native plant species within or near aquatic systems using methods that will provide the most protection to the aquatic and riparian ecological system, and minimize disturbance to the soil and wildlife. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.8.0.6 Implement long-term management of invasive and/or non-native plants to help maintain functioning ecological systems and biological diversity, and to enhance travel corridors. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.2 Improve the availability of prey/food resources through terrestrial and aquatic plantings and habitat restoration for SGCN populations, in particular for those populations thought to be limited due wholly or in part to a lack of (or contaminated) food resources, and for migratory species (birds, bats, invertebrates).

2.10.0.3 Restore and/or enhance habitats to benefit urban-associated SGCN.

2.10.0.4 Restore and/or enhance suitable travel corridors connecting conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats.

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.7 Restore/reclaim and enhance degraded rare species habitats through strategic revegetation and management efforts for documented/target SGCN.

2.10.0.8 Protect significant natural and/or unique communities by implementing best management practices when conducting habitat restoration strategies.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.10 Minimize the loss of important habitats (e.g., coastal scrub-shrub and grassy habitats, high and low marsh habitats, etc.) that provide nesting, migrating, and wintering areas for SGCN birds and other coastal and marsh-dependent species through habitat restoration efforts.

2.10.0.11 Restore and/or enhance critical migratory terrestrial and aquatic habitats (e.g., beach, grasslands, forest, scrub-shrub, etc.) for songbirds, raptors, shorebirds, waterfowl, bats and invertebrates through habitat restoration efforts and expand habitat restoration to adjacent private lands to increase the effective size of the habitat.

2.10.0.12 Create and/or maintain scrub-shrub habitats through revegetation efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.10.0.14 Implement best management practices (BMPs), protective strategies and guidelines for restoring and enhancing healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.15 Restore and/or enhance terrestrial and aquatic habitats proximate to but not adjacent to roads and other transportation corridors for terrestrial-bound SGCN species whose behavior (i.e., dispersal across roads) may be altered by doing so, and therefore decrease road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.10.0.21 Restore and/or enhance understory habitats that suppress invasive species and provide critical resources and enhance sheltering, foraging, and nesting cover for wildlife.

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.11.0.3 Create suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats through vegetation management.

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through vegetation management.

2.11.0.6 Reclaim degraded rare species habitats by conducting vegetation management needed to restore habitat value for the documented/target SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.8 Maintain, enhance and/or restore biologically appropriate buffers for SGCN-inhabited/used freshwater wetlands through vegetation management.

2.11.0.23 Implement appropriate habitat management actions in areas where natural disturbances, such as wildfire, have been precluded.

2.11.0.24 Conduct vegetation management adjacent to aquatic habitats following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.25 Conduct vegetation management along access roads following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.26 Conduct vegetation management along roadsides and medians, avoiding peak activity periods for wildlife, that enhances wildlife dispersal naturally and safely across roads and similar barriers to/between terrestrial and/or aquatic habitats.

2.11.0.27 Conduct vegetation management for target shrub- or young forest-dependent SGCN following BMPs to minimize the risk of the establishment of invasive and non-native plants.

2.11.0.28 Conduct vegetation management in agricultural areas following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.29 Conduct vegetation management on transportation and service corridors (i.e., rights-of-way) following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.30 Identify and prioritize areas where various management tools (such as increasing salinity through the management of water levels or chemical applications) may be effective in reducing phragmites within and restoring marsh habitat.

2.11.0.31 In areas where vegetative communities are shifting due to fire suppression and controlled burns are not feasible, manage vegetation to improve wildlife habitat.

2.11.0.32 Increase structural habitat diversity around and when feasible, within agricultural landscapes by managing vegetation for a variety of species, in particular, those farms that have removed scrub-shrub habitat and/or fragmented forests, and by implementing ecologically best practices (e.g., no-till farming, maintaining hedgerows, buffer set-asides, etc.).

2.11.0.33 Increase structural habitat diversity by implementing long-term vegetation management to minimize the potential for the establishment of invasive and/or non-native plants that may outcompete native vegetation.

2.11.0.34 Increase structural habitat diversity by managing residential, commercial and recreational areas' landscapes for a variety of species. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.35 Increase structural habitat diversity by managing vegetation adjacent to aquatic habitats in a manner that provides a buffer from runoff and erosion and a microclimate to stabilize seasonal temperatures to benefit a variety of aquatic and semi-aquatic species.

2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.

2.11.0.38 Increase structural habitat diversity in and around horse/livestock farms by managing vegetation for a variety of species, in particular, in and around farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

2.11.0.39 Increase structural habitat diversity in and around solar farms by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.40 Increase structural habitat diversity surrounding areas used for energy, mining, and transportation and service corridors by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides, and avoid managing habitat during the breeding seasons for ground-nesting birds, reptiles, amphibians and small mammals.

2.11.0.41 Increase structural habitat diversity through the implementation of a variety of vegetation management practices such a prescribed burns (either increasing or decreasing their frequency depending on the site and objective), plantings, etc. that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.42 Increase structural habitat diversity within wind farms for terrestrial bound and low-flying species and around wind farms for other wildlife by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.43 Manage forests to increase variation in age structure and composition using BMPs that promote and maintain functioning ecological forest-based systems and biological diversity.

2.11.0.45 Regularly and/or rotationally create young forest habitat in targeted areas to maintain and regenerate a mosaic of upland forest habitats that will benefit shrub- and young forest-dependent species.

2.12 Water management

2.12.1 Ditch plugs

2.12.1.1 Implement best management practices (BMPs), protective strategies, and guidelines for ditch plugging to maintain and enhance healthy, resident and migratory SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.12.3 Drainage

2.12.3.2 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) such as removing drainage ditches to restore natural stream flows and wetlands, that benefit wildlife inhabiting these areas.

2.12.3.3 Remove tile drains and drainage ditches to improve wetland hydrology and restore natural stream flows during appropriate times to avoid sensitive periods (e.g., nesting, denning, roosting) and minimizes harm to wildlife, particularly SGCN.

2.12.3.4 Expand the acreages and enhance the effective size of SGCN habitats by reclaiming/restoring adjacent, degraded habitats by removing tile drains and drainage ditches.

2.12.3.5 Remove drainage ditches adjacent to roads to decrease the attraction for amphibians, reptiles and small mammals, and thereby minimizing road mortality of such species (e.g., amphibians, snakes, turtles, small mammals).

2.12.3.6 Protect significant natural and/or unique communities by and when removing tile drains and drainage ditches.

2.12.3.7 Minimize habitat loss of critical coastal habitats that provide nesting, migrating, and wintering areas for birds and other coastal species by maintaining or enhancing these areas by removing drainage ditches.

2.12.3.11 Implement best management practices (BMPs), protective strategies, and guidelines when removing tile drains and drainage ditches to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.13 Wildlife damage management

2.13.0 Nuisance fish and wildlife damage

2.13.0.4 Investigate the effects of mosquito control methods on freshwater aquatic and semi-aquatic SGCN including but not limited to, amphibian, fish, dragonfly, and damselfly populations.

2.14 Wildlife disease management

2.14.0 Wildlife disease strategy development and investigation

2.14.0.1 Investigate diseases/pathogens impacting SGCN and/or their habitats.

2.14.0.2 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

2.14.0.3 Protect SGCN from exotic pathogen introduction or incident through implementation of a "rapid response plan"; DFW to give priority attention to these species in planning and/or implementing a response.

2.14.0.4 Conduct long-term monitoring of diseases in vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts.

2.14.0.5 Assess the impacts of diseases on the life cycles of wildlife.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.14 Identify areas with invasive, aquatic plants and animals and collect a detailed baseline assessment of the species' status and distribution. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort. Researchers and contractors performing Forest Stewardship Inventories and/or Plans on state lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.0.0.15 Conduct long-term monitoring of areas identified as having invasive, aquatic plants and animals to track the species' status/progress over time with or without the implementation of management strategies. Areas without management strategies should be assessed and prioritized for management/control. Areas where management strategies are being implemented should include an assessment of the management effort and identify/recommend and implement necessary changes to improve its success. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort.

3.0.0.19 Identify the presence and status (e.g., functioning, structure, slated for removal, etc.) of existing dams and culverts within and/or that may impact SGCN and their habitats, and create a database that includes a GIS component identifying the locations of such structures and their status. Share this information with appropriate organizations and/or agencies evaluating the benefits and risks of such structures on SGCN and their habitats.

3.0.0.20 Once baseline data identifying and describing the status of existing dams and culverts have been gathered, conduct evaluations at a variety of sites to determine whether the benefits of culvert and dam creation or removal outweigh the risks to SGCN species and their habitats, and if other variables/conditions specific to individual sites/locations result in a different outcome. Identify and target appropriate dams and culverts for removal and/or reconstruction to minimize harm to SGCN species and their habitats.

3.0.0.23 Identify (through wildlife and aquatic system surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and research water quality parameters for all [types of] aquatic systems for various SGCN populations.

3.0.0.26 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species including objectives and guidance pertaining to and the condition/status of critical and supporting habitats.

3.0.0.27 Evaluate the effectiveness of strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals through research and monitoring. Develop and provide NJ DEP and other appropriate governing agencies/commissions a summary of findings and recommendations to improve such efforts.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.3 Survey for and monitor populations of freshwater aquatic focal SGCN to assess the populations' demography, trends, condition, distribution, etc.

3.2.0.7 Track (via a database that includes a GIS component) and research problematic species and diseases to determine their distribution, impacts on SGCN wildlife/wildlife communities, and develop potential control measures.

3.2.0.8 Implement and conduct long-term monitoring of control measures aimed at minimizing the impacts of problematic species and/or diseases to evaluate the effectiveness of such efforts and to identify and incorporate additional strategies as appropriate.

3.2.0.18 Conduct baseline surveys/inventories to better understand the distribution of fish and invertebrate (including freshwater mussels) populations.

3.2.0.21 Investigate the effects of mosquito control methods on freshwater aquatic and semi-aquatic SGCN including but not limited to, amphibian, fish, dragonfly, and damselfly populations.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.2.2 Age, size and sex structure

3.2.2.1 Conduct wildlife surveys on resident and migratory SGCN regarding their survivorship.

3.2.3 Baseline inventory

3.2.3.9 Investigate hazardous environmental issues that may impact grassland invertebrates.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.6 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) that could, through revegetation and/or enhancement efforts, become suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN.

3.3.1.7 Map and prioritize existing and potential areas for early succession forest management. Share the results with state, county and municipal planners.

3.3.1.9 Inventory forests throughout northern New Jersey to develop a baseline characterization of the structure and composition of habitats and identify deficient forest habitat types.

3.3.1.10 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and document fish SGCN habitats by plotting their distributions in GIS and submitting the data to the State for integration into the DEP's Biotics database.

3.3.1.16 Gather "best information" for spatial modeling and update/create a current model/depiction of anticipated habitat shifts from sea-level rise, flooding, etc.

3.3.1.17 Identify and map undeveloped roads and trails in all conserved forests, and create a database of locations. Integrate information regarding potentially sensitive areas.

3.3.1.18 Conduct an assessment using available data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels.

3.3.1.19 Identify and codify legal ORV access areas on state (and if appropriate, other conserved) lands. Provide GIS mapping to the landowner for potential use in directing such recreational activities.

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.1.24 Conduct regular investigations of SGCN habitat health and biodiversity on public and private lands to identify locations in need of revegetation, reduction of over-abundant, native wildlife and/or exotic species, conservation focal areas requiring limitations on human activity, etc.

3.3.1.26 Survey all historic locations and unsurveyed suitable habitats to identify populations of freshwater aquatic focal species.

3.3.2 Monitoring

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

3.3.2.4 Protect water quality and aquatic-dependent species by appropriately designating Category 1 waters and enforcing protective regulations. Seek appropriate classifications for stream segments based on Endangered and Threatened Status and/or the Index of Biotic Integrity (IBI) results that do not fulfill Category One requirements.

3.3.2.5 Conduct long-term monitoring of water quality of SGCN aquatic habitats (and aquatic systems feeding into those habitats) to evaluate protection and management efforts to reduce, if not eliminate, chemical contamination, siltation, eutrophication, and other forms of pollution/contamination of aquatic systems.

3.3.2.10 Evaluate the efficacy and success of different management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.3.2.14 Research and evaluate the effectiveness of water quality management practices on water-dependent and semi-dependent SGCN, particularly those practices associated with permitting or mitigation actions.

3.3.2.15 Investigate the effectiveness of management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.3.2.20 Once a system is developed for reporting and qualifying new locations of invasive species, develop, implement and monitor/evaluate invasive species removal strategies at identified locations. Priority should be given to those areas critical to SGCN and/or contain unique and/or rare plant communities supporting SGCN and/or other fish/wildlife species.

3.3.2.24 Conduct regular inventories of forests throughout northern New Jersey to characterize the changing structure and composition of habitats and monitor forest conditions.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.1 Work with land management agencies to determine the appropriate actions needed to restore/reclaim degraded habitat for the documented/target SGCN.

3.5.3.3 Develop/improve management techniques that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.8 Develop best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5.3.9 Develop strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

3.5.3.11 Develop strategies to protect native terrestrial and aquatic habitats and dependent SGCN species from the identified threats.

3.5.3.14 Develop aquaculture practices in the coastal areas that are compatible with the recovery of SGCN.

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.3.16 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.3.21 Develop management techniques (e.g., ecologically-based forestry activities, prescribed burns) that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

3.5.3.23 Revise water quality management practices based on research on water-dependent and semi-dependent SGCN, particularly when associated with permitting or mitigation actions.

3.5.3.24 Based on research, modify management techniques implemented to eliminate invasive terrestrial and aquatic plant species on private and public lands, and/or within sensitive and/or important habitats for SGCN.

3.5.3.25 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to develop the necessary management strategies to reach or maintain viable population levels.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.4 Investigate the effects of mosquito control methods on freshwater aquatic and semi-aquatic SGCN including but not limited to, amphibian, fish, dragonfly, and damselfly populations.

3.5.4.5 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

3.5.4.6 Investigate the feasibility of mitigating for the impacts of contaminants to vulnerable wildlife, particularly SGCN. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.5.4.14 Develop and implement agreements, and update existing agreements, with government agencies regarding the protection of critical SGCN habitats (e.g., significant breeding populations of beach nesting birds, colonial waterbird nesting areas, bat colonies, etc.).

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.18 Investigate the effectiveness of survey techniques through selected “ground truthing” and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

3.5.4.21 Develop BMPs to address problematic species and diseases of unknown origin.

4 Education

4.1 Educator/Instructor training

4.1.0 Public education

4.1.0.1 Provide educational resources and training programs to private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

5 Facilities and Areas

5.15 Wildlife Management Areas

5.15.6 Roads

5.15.6.1 Clearly post areas/roads where vehicle access is permitted.

5.15.6.2 Clearly post areas/trails where vehicle access is not permitted.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.3 Secure and protect riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.7 Secure and protect critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN and/or connect conserved SGCN habitats through conservation area designations.

6.3.0.3 Increase the protection of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through conservation area designations.

7 Law Enforcement

7.1 Law enforcement

7.1.3 Sub-national Level

7.1.3.2 Increase the number of law enforcement officers tending to wildlife issues to a reasonable number to sufficiently cover the State and marine waters.

7.1.4 Scale Unspecified

7.1.4.1 Improve enforcement of policies and/or regulations that promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

7.1.4.12 Implement policies and/or regulations that protect significant natural and/or unique communities in perpetuity.

7.1.4.16 Implement policies that protect and restore riparian areas.

7.1.4.17 Improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

7.1.4.26 Educate law enforcement personnel that there may be unauthorized research projects taking place and to encourage them to investigate any activities that appear to be harmful to wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.2 Develop a team of personnel from government entities, conservation organizations and other stakeholders engaged in oil/gas spill response for marine and freshwater habitats to develop a feasible plan for oil spill response and/or to amend NJ's current oil spill response plan that clearly outlines each organizations responsibilities and an assessment and location list of available equipment for boom deployment during oil spills.

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.1.0.4 Engage government agencies, conservation partners and other stakeholders in constructive dialogues encouraging them to influence policy change and the creation of incentives through a habitat bill and/or municipal ordinances for backyard habitat.

8.1.0.15 Engage government agencies, conservation partners and other stakeholders in discussions encouraging and supporting the creation of laws and policies requiring vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

8.1.0.16 Engage local governments in discussions regarding the importance of them adopting/passing ordinances which require assessing and addressing secondary impacts (i.e., ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

8.1.0.17 Engage municipalities in constructive dialogue to identify and minimize destruction of areas prioritized for early succession forest management.

8.1.0.18 Engage NJDOT, NJ Transit Authority and other road management entities, wildlife conservation organizations/agencies (e.g., Division of Fish and Wildlife, New Jersey Conservation Foundation, Conserve Wildlife Foundation of NJ), and communities and citizens in discussions regarding the importance of and methods to enhance habitat connectivity, and work together to develop feasible strategies for ensuring that wildlife can disperse naturally and safely across roads and similar barriers to terrestrial and/or aquatic habitats.

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

8.1.0.20 Organize a small focal group of government and non-government agencies/organizations responsible for decisions regarding beach/dune management to share and coordinate their goals so that comprehensive planning can attempt to meet all needs.

8.1.0.21 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation human-subsidized and/or overabundant, native species cause to local nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.22 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation invasive species cause to native nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.26 Coordinate across federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to woodland landowners to adopt or endorse consistent best management practices concerning controlled burns to maintain and/or improve forested habitat for wildlife.

8.1.0.30 Encourage government agencies and conservation partners to advise members of the relevant scientific community of the need for specific studies, reports or investigations targeting the data-deficiency regarding SGCN and/or their habitats.

8.1.0.33 Engage government agencies, conservation partners and other land managers, communities, landowners, and commercial and industrial stakeholders in discussions regarding the importance of protecting and methods to protect priority wetlands beyond the levels afforded through regulation by maintaining and/or restoring optimal biological buffers around wetlands.

8.1.0.34 Work with the NJ Education Association and Department of Education to design curriculum and outdoor experimental learning opportunities, and provide training to teachers on implementation of these activities.

8.1.0.37 Enlist landowners and NJ citizens in the protection of and survey efforts for SGCN, in particular rare species, by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management and wildlife-related volunteer programs.

8.1.0.38 Engage partners, stakeholders and land managers in constructive dialogue promoting forest stewardship for SGCN that use core forests and forested corridors.

8.1.0.40 Encourage researchers, land managers, naturalists and enthusiasts to follow proper procedures for the coordination and/or permitting of research/management activities involving wildlife and sensitive habitats, and discourage activities that alter vegetation or wetlands, or cause harm or disturbance to wildlife.

8.1.0.42 Engage citizens, wildlife observers and photographers through discussions and distributable information regarding the importance of and encouraging implementing responsible and ethical behavior when observing wildlife by developing an alliance of wildlife photographers and widely circulating recommendations on how to reduce impact.

8.1.0.44 Engage conservation partners, stakeholders, government agencies and other land stewards in constructive dialogues encouraging their inclusion of controlled burns in forest and other stewardship plans.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.1.0.48 Form cooperative partnerships with transportation and shipment agencies and companies to facilitate habitat creation and enhancement away from and outside of project areas and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.2 Recruitment and retention activities

8.2.3 For wildlife watching

8.2.3.1 Develop and implement nature-focused tourism opportunities including wildlife viewing sites, interpretive signage highlighting unique ecosystems/habitats, and wildlife-related recreational opportunities that do not negatively impact SGCN or their habitats.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.7 Develop and provide (or otherwise make publicly available) educational programs and/or materials that describe the negative impacts of off-road vehicles and watercraft use in and adjacent to critical SGCN habitats, and the importance of confining such activities to more appropriate locations and/or seasons.

8.3.0.8 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate recreationists and encourage landowners to eliminate garbage in the vicinity of suitable wildlife habitat, in particular SGCN habitat. Information should include the detrimental impacts garbage may have on various wildlife species.

8.3.0.9 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners and land managers to include only native plants in landscaping and restoration projects. Provide information to assist them in detecting problematic establishment of invasive, non-indigenous plants.

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.11 Develop and provide (or otherwise make publicly available) educational programs and/or materials to the public, wildlife-related professionals, foresters, etc., that describe the value of species that are often feared (e.g., snakes, bats, spiders, Allegheny woodrat) and/or deemed a "nuisance" (e.g., squirrel, deer, snapping turtle), and therefore, persecuted by people. Include information on tolerance, proper identification, eviction from human dwellings, how to minimize the animal's presence on the property, and/or how to live in harmony with the animal.

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

8.3.0.24 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

8.3.0.25 Develop educational outreach programs for landowners, nurseries and the general public regarding the negative impacts of invasive and non-native plants on our natural communities.

8.3.0.26 Develop educational outreach programs for private and public landowners and land managers regarding the importance of and how to manage core forests and forested corridors in a way that will be beneficial for SGCN, particularly endangered, threatened and special concern species.

8.3.0.27 Develop educational outreach programs for public and private landowners and land managers regarding the importance of structural habitat diversity, methods to increase diversity, and/or incentive programs available to increase habitat diversity.

8.3.0.29 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about the importance of maintaining a vegetative buffer along riparian and aquatic habitats to intercept storm water runoff and minimize soil erosion.

8.3.0.30 Develop educational outreach programs for private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.5 Develop a plan that directs the creation or expansion of energy or utility rights-of-way in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.6 Develop a plan that directs the creation or expansion of roads and railroads or the re-establishment of abandoned railroads within and adjacent to critical forested habitats in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.7 Develop a plan that directs the maintenance of or new channelization of forested streams and rivers in a manner that minimizes impacts of the aquatic ecological system and adjacent forest

9.1.0.8 Develop a plan that focuses on strategies for oil pipelines to avoid sensitive habitats that would be highly impacted by oil spills.

9.1.0.9 Develop a plan that focuses on strategies to minimize the creation of renewable energy farms (e.g., solar, wind) and related infrastructures within and their impacts on forested habitats and the wildlife community.

9.1.0.10 Develop a plan that focuses on strategies to minimize the impacts of mining on critical forested habitats.

9.1.0.11 Develop a plan that focuses on strategies to minimize the impacts of power plants on critical forested habitats and the wildlife community.

9.1.0.13 Develop a plan to minimize agriculture that would result in groundwater withdrawal in critical forested areas.

9.1.0.14 Develop a plan to minimize development that would result in groundwater withdrawal in critical forested areas.

9.1.0.15 Develop a plan to minimize fragmentation of terrestrial and aquatic habitats by roads.

9.1.0.16 Develop a plan to minimize new lawnscapes and preserve natural vegetation within and adjacent to critical forest areas.

9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.31 Develop wetland restoration plans that consider the life history and needs of wildlife occupying targeted habitats.

9.1.0.32 Incorporate aquatic habitat connectivity and water quality/effluent standards into local and state aquaculture plans and BMPs.

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.2 Organizational strategic and CMS planning

9.2.1 Organizational strategic and operational planning

9.2.1.1 Identify and codify legal ORV access areas on state lands.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.5 Develop response plans to address disease outbreaks within wildlife populations, in particular SGCN.

9.3.1.7 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.10 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.15 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.1.16 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3 Habitat management planning

9.3.3.5 Develop a management plan using forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

9.3.3.7 Develop a management plan to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

9.3.3.8 Develop a management plan to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.3.13 Develop a management plan that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas and prevents or ameliorates near-term impacts of climate change throughout the State, but in particular within the coastal and Delaware Bay areas.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.16 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.21 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.3.24 Develop a plan to improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

9.3.3.28 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.3.29 Develop habitat management plans aimed at reducing or eliminating negative impacts of ORVs.

9.3.3.32 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activities and to improve SGCN habitat and presence.

9.3.3.34 Include controlled burn prescriptions in forest and stewardship plans to improve wildlife habitat.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.1 Use Biotics database and Landscape Project Mapping in regulatory reviews to ensure protection by applicable laws and regulations.

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.3 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.1.1.12 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed solar farm projects to reduce habitat fragmentation and minimize impacts on wildlife.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.2.2 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildlife occupying the targeted habitats.

11.1.2.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into the environmental review process to help establish policies and plans that minimize the impact of aquaculture on fish and wildlife.

11.1.2.4 Review strategies for creating or enhancing connectivity (e.g., installing appropriately-sized wildlife passages) between wetlands to allow wildlife to disperse naturally and safely.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.2 Provide technical support to public and private landowners and land managers for controlling invasive, native and non-native plant species in order to increase structural habitat diversity.

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

11.2.0.7 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on the importance of maintaining habitat connectivity, minimizing fragmentation, and the use of CHANJ products to help them target areas for such planning.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

11.2.0.11 Provide educational resources, training programs, and on-the-ground guidance to private and public landowners and land managers on the benefits of and for creating young forest and early succession habitat for SGCN.

11.2.0.14 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters), and to enhance or restore biologically appropriate buffers.

11.2.0.15 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and landowners about the importance of retaining and in an effort to protect, create, enhance and/or restore vegetation along aquatic habitats.

11.2.0.17 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of vernal pools and the protection, enhancement and/or restoration of biologically appropriate buffers.

11.2.0.22 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

11.2.0.23 Provide educational resources and technical support to public and private landowners and land managers of lands adjacent to SGCN habitats to promote the protection and/or enhancement of those adjacent habitats to increase the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and that connect conserved SGCN habitats.

11.2.0.24 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers on how to manage vegetated roadside areas (e.g., mowing, brush-hogging, etc.) on a schedule that avoids peak activity periods for wildlife and therefore, minimizes harm.

11.2.0.25 Provide educational resources, training programs, and on-the-ground guidance to resource managers regarding the assessment of and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) related to residential and commercial development.

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.1 Engage partners and stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

11.2.1.3 Provide educational resources, training programs, and on-the-ground guidance to DOD to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop and implement forest management and other practices that minimize disturbances to SGCN (i.e., beyond their federal requirements).

11.2.1.5 Provide educational resources, training programs, and on-the-ground guidance to municipalities, state and federal agency resource managers on tasks such as writing and integrating Beach Management Plans into other management documents.

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

11.2.2 With private landowners

11.2.2.1 Provide technical support to farming operations and woodland landowners on ways to decrease clean farming (edge-to-edge) practices and create ecotones to benefit bobwhite and other species dependent on early successional habitat.

100 Law and Policy

100. Legislation

100.1.3 Sub-national Level

100.1.3.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.3.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

100.1.4 County and Local

100.1.4.2 Secure and increase the effective size of SGCN habitats and connect conserved SGCN habitats through local ordinances.

100.1.4.3 Expand the acreages and enhance the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN through local ordinances.

100.1.4.4 Secure wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and biologically appropriate buffers through local ordinances.

100.1.4.5 Secure SGCN-inhabited/used freshwater wetlands and biologically appropriate buffers through local ordinances.

100.1.4.11 Secure riparian areas through local ordinances.

100.1.4.14 Adopt/pass local ordinances which require assessing and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.5.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildlife occupying targeted habitats.

100.1.5.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into state/local policy to minimize the impact of aquaculture on fish and wildlife.

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100.1.5.5 Develop legislation to provide financial support for the New Jersey Invasive Species Strike Team.

100. State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.1 Develop (and/or improve) policies and/or regulations that will promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

100.3.0.5 Develop policies that will promote improved and secure habitat connections between conserved SGCN habitats.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.12 Develop policies that promote the preservation and protection of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN.

100.3.0.13 Develop policies that will promote protecting and restoring riparian areas.

100.3.0.14 Develop policies and/or regulations that increase the protective buffers of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) to biologically appropriate distances to benefit SGCN that rely upon these habitats and improve the function of the [associated] aquatic systems.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.23 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.26 Adopt regulations requiring the combined sewer overflow alternative analyses required by regulation address potential impacts to wildlife in watercourses or receiving water bodies.

100.3.0.31 Create or expand tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMPs.

100.3.0.32 Coordinate regulations across agencies to maximize availability of and enrollment in existing Forestry Stewardship Programs (e.g., "Woodland Stewards", Farm Bill, partners, etc.) to maintain and/or improve forest habitat.

100.3.0.38 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.3.0.39 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.3.0.40 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

100.3.0.44 Incorporate requirements for technical support and funding for mitigation or restoration efforts so as to be consistent with existing regulations.

100.3.0.45 Increase the controlled burn season to focus on restoring vegetative communities.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.48 Propose new State law or regulation mandating that a State-level "development impact fee" be assessed on all new development approved by municipalities (via the Municipal Land Use Law processes), and dedicate such monies to the development and implementation of regional Habitat Conservation Plans (or existing plans/programs serving the same regional function).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.53 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded rights-of-way corridors associated with energy transport/transmission.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.64 Develop regulations that when implemented will protect and restore riparian areas.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100.3.0.73 Develop regulations that would exempt the conversion of lawns to native vegetation (beneficial to wildlife) from local lawn ordinances.

100.3.2 State Land Acquisition Programs

100.3.2.1 Increase opportunities for habitat restoration by making any necessary policy changes to state, federal and local land acquisition programs (e.g., Green Acres, Blue Acres, etc.) to allow for acquisition within abandoned or failing bay shore communities, including mechanisms to relocate displaced people and infrastructure.

100. State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.2 Create a policy that requires the NJ DEP to incorporate scientific information regarding climate change and sea level rise (e.g., predictions, habitat management/acquisition efforts to enhance resilience to inundation) on their websites and to work with other government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

100.4.0.3 Develop policies for mandatory buffer strips on preserved farmlands and state-owned agricultural lands.

100.4.0.8 Develop a white paper addressing the impacts that existing, new or expanded rights-of-way have upon wildlife, wildlife habitats and habitat connectivity.

100.4.0.10 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.4.0.11 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.4.0.12 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.4.0.13 Develop policies for different circumstances (e.g., roadsides and medians, riparian, aquatic and terrestrial habitats) that outline appropriate habitat/vegetation management strategies and schedules to minimize risks to and benefit wildlife.

100.4.0.16 Develop policies to implement habitat management strategies that will increase the structural diversity surrounding areas used for energy, mining, and transportation and service corridors which include but are not limited to the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-

100.4.0.17 Develop policies to implement habitat management strategies, including prescribed burns, that will increase the structural diversity on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies to control and reduce the impacts of invasive, non-native species in order to increase structural habitat diversity.

100.4.0.18 Develop policies to minimize the extent of infrastructure associated with energy and service corridors or areas (e.g., wind and solar farms, pipelines, utility lines) and that require the implementation of habitat management strategies that will increase the structural diversity in the area including (e.g., the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides).

100.4.0.19 Develop regulations that will minimize the creation of new barriers, remove or replace current barriers with appropriately-sized systems to accommodate wildlife dispersal, and to minimize road widening and traffic volume increases within critical wildlife habitat areas.

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.21 Ensure that Section 303(d) of the Clean Water Act and applicable State statutory/regulatory requirements for surface water pollutant budgets are being met by monitoring and enforcing regulatory Total Maximum Daily Load (TMDL) targets established within regional Water Quality Management Plans.

100.4.0.22 Work with NJ DEP's Division of Land Use Regulation to ensure protection of listed species and their habitats during stream cleaning events.

100.4.0.24 Develop policies to provide financial support for the New Jersey Invasive Species Strike Team.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

This page intentionally left blank

Appendix K: Projects to Conserve New Jersey's Wildlife Populations of Concern

NJ State Wildlife Action Plan, 2017

Projects to Conserve
New Jersey's Wildlife Populations of Concern

NJ Department of Environmental Protection
Division of Fish and Wildlife
March 28, 2018

NEW JERSEY DIVISION OF
Fish and Wildlife

Table of Contents

Page

Introduction K-1
Project Format and Information K-1

Projects

1. State Wildlife Action Plan Integration and Implementation K-2
2. Update Species' Location Mapping K-12
3. Region-based Habitat Conservation Plans: Statewide K-16
4. Climate Change Impacts to New Jersey Wildlife and Residents K-28
5. Barriers to Conservation Efforts K-39
6. Coastal and Shoreline Stabilization K-44
7. Unify Coastal Landowners on Beach and Dune Management and Shoreline Stabilization Practices K-57
8. Coastal Marsh Migration K-61
9. Marsh Habitats in Trouble K-67
10. Best Management Practices (BMPs) to Benefit SGCN and their Habitats K-81
11. Habitat Management to Improve Ecological Diversity K-101
12. Habitat Management through Prescribed Burns K-163
13. Military Lands Management Coordination K-172
14. Fostering Habitat in Urbanized/Suburbanized Areas K-180
15. Mapping Early Successional Habitats for Planning and Management K-183
16. Farming for Bobwhite Quail K-186
17. Habitat Connectivity K-189
18. Invasive and Non-native Species Control K-203
19. Invasive and Native Species Control K-223
20. Incentives to Encourage Wildlife Conservation Efforts K-229
21. *[Project: Tax Structure for Conservation, Job 21.01: This Job is currently under development.]* K-246
22. Habitat Protection K-247
23. Land Use Planning K-265
24. Marine Protection K-279
25. Fisheries Management K-286
26. Pollutants Come in Many Forms K-313
27. Research and Monitoring K-325
28. Harvests, By-catch and Impingement K-346
29. Limiting Effects of Predators K-358
30. Do Not Disturb the Birds K-360
31. Aquaculture, Wildlife and Habitat K-368
32. Education and Outreach K-380

A. Introduction

Conservation partners provided a wide-ranging list of needed conservations actions during three Action Development Workshops in 2015. Some of these actions were broad in nature, applying to multiple species of conservation need (SGCN) and their habitats, while others were highly specific. The Division of Fish and Wildlife (DFW) grouped actions when they addressed a particular threat, a suite of related threats, or an overarching conservation need. These groups of actions lent themselves to the creation of "projects". Additional details on the development of these projects are provided in Chapter 3.

This report contains 31 projects that provide guidance for conservation organized around broad issues, threats, and needs; a 32nd project is under development. This report is not intended to represent a comprehensive or exhaustive catalog of conservation projects and is not prioritized in any way. Rather, the report provides examples of how threats and actions can be used by conservation partners to formulate specific species- or threat-oriented conservation initiatives or to pursue actions related to the projects presented here. The DFW intends to expand and refine the projects report in the future and seek conservation partner input on prioritization of the projects.

B. Project Format and Information

Each project consists of one or more jobs intended to focus conservation efforts on tasks that would collectively help accomplish the project. While jobs may indirectly benefit many wildlife species, the report identifies only the Focal SGCN that are specifically addressed. Each job contains the following information:

- Objectives and purpose;
- Expected benefits to wildlife and their habitats;
- Underlying threats; and
- Conservation actions recommended to ameliorate threats.

This Plan explicitly focuses on the development and implementation of actions to conserve New Jersey's wildlife species of conservation need (SGCN) and the habitats on which they depend. However, New Jersey also supports an extraordinarily diverse flora, described in Chapter 3, Section VI, including natural communities that provide significant habitat for wildlife SGCN and associated rare plants.

The actions, projects, and monitoring programs presented in this plan for wildlife also provide an opportunity to contribute to the conservation of rare plants and natural communities. At the same time, without proper precautions, actions directed at enhancing wildlife, especially "on-the-ground" actions that modify habitats, may pose risks to rare native flora. As such, it is important that land and wildlife managers consider plant communities when implementing conservation actions and monitoring programs for wildlife. Additional guidance for integrating rare plants and natural communities into wildlife planning and action implementation is presented in Attachment IV.

Project 1. State Wildlife Action Plan Integration and Implementation

Job 1.01. Coordinate the State Plan with the State Wildlife Action Plan

Objective: For the State Planning Commissioner to update NJ's State Plan with guidance from NJ's State Wildlife Action Plan (SWAP) such as SGCN information and prioritization of habitats and land parcels, resulting in SWAP implementation through State permit decisions.

Purpose: Minimize fragmentation and loss of critical wildlife habitats and corridors resulting from development and infrastructure.

Benefits: New development and infrastructure is planned and implemented to maintain ecologically important habitats with minimal fragmentation, and viable wildlife populations are supported with fewer human conflicts.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	American Woodcock	Black Rail
Black Skimmer	Blue-winged Warbler	Bobolink
Cerulean Warbler	Common Tern	Eastern Meadowlark
Forster's Tern	Golden-winged Warbler	Grasshopper Sparrow
Kentucky Warbler	Least Tern	Little Blue Heron
Northern Bobwhite	Northern Harrier	Peregrine Falcon
Pied-billed Grebe	Piping Plover	Prothonotary Warbler
Red Knot	Red-headed Woodpecker	Ruddy Turnstone
Scarlet Tanager	Snowy Egret	Tricolored Heron
Vesper Sparrow	Wood Thrush	

Fish

Alewife	Atlantic Sturgeon	Banded Sunfish
Blackbanded Sunfish	Blueback Herring	Bridle Shiner
Brook Trout	Comely Shiner	Ironcolor Shiner
Mud Sunfish	Shortnose Sturgeon	Swamp Darter

Macroinvertebrates

A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper
Ashton Cuckoo Bumble Bee	Brook Floater	Buchholz's Dart Moth

Buchholz's Gray	Carter's Noctuid Moth	Daecke's Pyralid Moth
Dotted Skipper	Dwarf Wedgemussel	Eastern Lampmussel
Frosted Elfin	Georgia Satyr	Green Floater
Hoary Elfin	Leonard's Skipper	Little White Tiger Beetle
Maritime Sunflower Borer Moth	New England Bluet	New Jersey Pine Barrens Tiger Beetle
Northeastern Beach Tiger Beetle	Northern Metalmark	Papaipema harrisii
Pine Barrens Bluet	Pink Sallow	Robust Baskettail
Rusty Patched Bumble Bee	Sand Myrtle Looper/Pink	Scarlet Bluet
Septima's Clubtail	Southeastern Beach Tiger Beetle	Southern Plains Bumble Bee
Superb Jewelwing	Triangle Floater	Variable Cuckoo Bumble Bee
Yellow Bumble Bee	Yellow Lampmussel	Yellow-banded Bumble Bee

Mammals

Allegheny Woodrat	Indiana Bat	Little Brown Bat
North Atlantic Right Whale	Northern Myotis	

Reptiles & Amphibians

Atlantic Green Turtle	Atlantic Leatherback	Atlantic Loggerhead
Atlantic Ridley	Bog Turtle	Carpenter Frog
Corn Snake	Eastern Box Turtle	Eastern Hognose Snake
Eastern Redbelly Turtle	Eastern Spadefoot	Eastern Tiger Salamander
Longtail Salamander	New Jersey Chorus Frog	Northern Black Racer
Northern Diamondback Terrapin	Northern Pine Snake	Northern Red Salamander
Northern Scarlet Snake	Pine Barrens Treefrog	Timber Rattlesnake
Wood Turtle		

Threats and Action Drivers associated with this conservation need

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale)

1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.1.1.2 Loss, alteration and/or degradation of habitat.

1.1.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.

1.1.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale)

1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.2.1.2 Loss, alteration and/or degradation of habitat.

1.2.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.

1.2.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.

1.2.1.5 Impervious surfaces can lead to a decrease in water recharge.

1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale)

1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.3.1.2 Loss, alteration and/or degradation of habitat.

1.3.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory

12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.2 Lack of up-to-date existing information

12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.3 Need to answer research question

12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.1.3.4 Lack of information regarding the potential short- and long-term impacts of wind turbines and other tall coastal structures on migratory populations.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

14 Education/ Outreach Needs

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions

14.2.1.4 Need to develop greater understanding of and support for efforts implemented to maintain disturbance-free habitats that allow coastal wildlife populations to thrive alongside human residential and recreational uses.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.24 Identify (through aerial and topographic maps), and confirm through field surveys, potential vernal pools using standard protocols. Provide confirmed vernal pool locations (and when possible, a description of the pools condition) and species' presence data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.25 Identify pathways of migratory SGCN in the Atlantic Coastal and Marine Regions (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and use the data to help evaluate the potential short- and long-term impacts of wind turbines, radio towers, utility guy lines, and other tall coastal structures on migratory populations.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.3 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) remaining high and low marsh habitats with natural buffers and stable water levels that provide suitable habitat for SGCN and marsh habitats that would benefit from restoration. Conduct research to assess their condition for nesting, migrating and wintering birds.

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

3.3.1.10 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and document fish SGCN habitats by plotting their distributions in GIS and submitting the data to the State for integration into the DEP's Biotics database.

8 Outreach

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.20 Develop an educational outreach program for landowners, particularly those in the coastal and bay areas, boaters, and the general public with information about the negative impacts on marine wildlife and habitats, and steps they can implement to reduce these impacts.

8.3.0.22 Post signage in sensitive coastal habitats (e.g., bird and Diamondback Terrapin nesting areas) to educate the boating community on responsible use of these areas.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.33 Review the species, threats, action successes, and habitats, and work with partners to revise the 2017 State Wildlife Action Plan for the 2025 resubmittal.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

100 Law and Policy

100.3 State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100.4 State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Job 1.02. Integrate the State Wildlife Action Plan Across State Departments and Divisions

Objective: Integrate SWAP guidance and recommendations into regulatory, acquisition, and management decisions throughout all State Departments and Divisions.

Purpose: Provide biologically appropriate protection to species currently unprotected by land use patterns and decisions.

Benefits: Reduce the direct loss of habitat and improve habitat conditions.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	American Woodcock	Black Rail
Black Skimmer	Blue-winged Warbler	Bobolink
Cerulean Warbler	Common Tern	Eastern Meadowlark
Forster's Tern	Golden-winged Warbler	Grasshopper Sparrow
Kentucky Warbler	Least Tern	Little Blue Heron
Northern Bobwhite	Northern Harrier	Peregrine Falcon
Pied-billed Grebe	Piping Plover	Prothonotary Warbler
Red Knot	Red-headed Woodpecker	Ruddy Turnstone
Scarlet Tanager	Snowy Egret	Tricolored Heron
Vesper Sparrow	Wood Thrush	

Fish

Alewife	Atlantic Sturgeon	Banded Sunfish
Blackbanded Sunfish	Blueback Herring	Bridle Shiner
Brook Trout	Comely Shiner	Ironcolor Shiner
Mud Sunfish	Shortnose Sturgeon	Swamp Darter

Macroinvertebrates

A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper
Ashton Cuckoo Bumble Bee	Brook Floater	Buchholz's Dart Moth
Buchholz's Gray	Carter's Noctuid Moth	Daecke's Pyralid Moth
Dotted Skipper	Dwarf Wedgemussel	Eastern Lampmussel
Frosted Elfin	Georgia Satyr	Green Floater
Hoary Elfin	Leonard's Skipper	Little White Tiger Beetle
Maritime Sunflower Borer Moth	New England Bluet	New Jersey Pine Barrens Tiger Beetle

Northeastern Beach Tiger Beetle	Northern Metalmark	Papaipema harrisii
Pine Barrens Bluet	Pink Sallow	Robust Baskettail
Rusty Patched Bumble Bee	Sand Myrtle Looper/Pink	Scarlet Bluet
Septima's Clubtail	Southeastern Beach Tiger Beetle	Southern Plains Bumble Bee
Superb Jewelwing	Triangle Floater	Variable Cuckoo Bumble Bee
Yellow Bumble Bee	Yellow Lampmussel	Yellow-banded Bumble Bee

Mammals

Allegheny Woodrat	Indiana Bat	Little Brown Bat
North Atlantic Right Whale	Northern Myotis	

Reptiles & Amphibians

Atlantic Green Turtle	Atlantic Leatherback	Atlantic Loggerhead
Atlantic Ridley	Bog Turtle	Carpenter Frog
Corn Snake	Eastern Box Turtle	Eastern Hognose Snake
Eastern Redbelly Turtle	Eastern Spadefoot	Eastern Tiger Salamander
Longtail Salamander	New Jersey Chorus Frog	Northern Black Racer
Northern Diamondback Terrapin	Northern Pine Snake	Northern Red Salamander
Northern Scarlet Snake	Pine Barrens Treefrog	Timber Rattlesnake
Wood Turtle		

Threats and Action Drivers associated with this conservation need

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale)

1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.1.1.2 Loss, alteration and/or degradation of habitat.

1.1.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.

1.1.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale)

1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.2.1.2 Loss, alteration and/or degradation of habitat.

1.2.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.

1.2.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale)

1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.3.1.2 Loss, alteration and/or degradation of habitat.

1.3.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

11 Technical Assistance

11.2 Technical assistance

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

100 Law and Policy

100.4 State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

Project 2. Update Landscape Project

Job 2.01. Regularly update the Landscape Project data and methodology

Objective: To provide better planning tools by updating the Landscape Project mapping and methodology more frequently, based on the most recent land-use/land-cover data, habitat associations and species occurrence data.

Purpose: To provide data that are easily accessible and can be pro-actively integrated with planning, protection and land management programs in order to guide strategic wildlife habitat conservation, minimize conflict and protect imperiled species.

Benefits: Landscape Project mapping that reflects the most recent data on the state of the landscape and species occurrence information will enable land use planning and management decisions to be informed by the most accurate and current data possible leading to better planning and more effective conservation of habitat.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	American Woodcock	Black Rail
Black Skimmer	Blue-winged Warbler	Bobolink
Cerulean Warbler	Common Tern	Eastern Meadowlark
Forster's Tern	Golden-winged Warbler	Grasshopper Sparrow
Kentucky Warbler	Least Tern	Little Blue Heron
Northern Bobwhite	Northern Harrier	Peregrine Falcon
Pied-billed Grebe	Piping Plover	Prothonotary Warbler
Red Knot	Red-headed Woodpecker	Ruddy Turnstone
Scarlet Tanager	Snowy Egret	Tricolored Heron
Vesper Sparrow	Wood Thrush	

Fish

Alewife	Atlantic Sturgeon	Banded Sunfish
Blackbanded Sunfish	Blueback Herring	Bridle Shiner
Brook Trout	Comely Shiner	Ironcolor Shiner
Mud Sunfish	Shortnose Sturgeon	Swamp Darter

Macroinvertebrates

A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper

Ashton Cuckoo Bumble Bee	Brook Floater	Buchholz's Dart Moth
Buchholz's Gray	Carter's Noctuid Moth	Daecke's Pyralid Moth
Dotted Skipper	Dwarf Wedgemussel	Eastern Lampmussel
Frosted Elfin	Georgia Satyr	Green Floater
Hoary Elfin	Leonard's Skipper	Little White Tiger Beetle
Maritime Sunflower Borer Moth	New England Bluet	New Jersey Pine Barrens Tiger Beetle
Northeastern Beach Tiger Beetle	Northern Metalmark	Papaipema harrisii
Pine Barrens Bluet	Pink Sallow	Robust Baskettail
Rusty Patched Bumble Bee	Sand Myrtle Looper/Pink	Scarlet Bluet
Septima's Clubtail	Southeastern Beach Tiger Beetle	Southern Plains Bumble Bee
Superb Jewelwing	Triangle Floater	Variable Cuckoo Bumble Bee
Yellow Bumble Bee	Yellow Lampmussel	Yellow-banded Bumble Bee

Mammals

Allegheny Woodrat	Indiana Bat	Little Brown Bat
North Atlantic Right Whale	Northern Myotis	

Reptiles & Amphibians

Atlantic Green Turtle	Atlantic Leatherback	Atlantic Loggerhead
Atlantic Ridley	Bog Turtle	Carpenter Frog
Corn Snake	Eastern Box Turtle	Eastern Hognose Snake
Eastern Redbelly Turtle	Eastern Spadefoot	Eastern Tiger Salamander
Longtail Salamander	New Jersey Chorus Frog	Northern Black Racer
Northern Diamondback Terrapin	Northern Pine Snake	Northern Red Salamander
Northern Scarlet Snake	Pine Barrens Treefrog	Timber Rattlesnake
Wood Turtle		

Threats and Action Drivers associated with this conservation need

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory

12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.2 Lack of up-to-date existing information

12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

Conservation actions that address Threats and Action Drivers

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.6 Conduct long-term studies on resident and migratory SGCN to determine if there are changes to the populations' demography (productivity, survival, dispersal) and/or to their critical and/or supporting habitats (i.e., diminishing in value, acreage or connectivity, etc.), in particular changes that would not maintain SGCN at viable levels for species populations. Update data and GIS maps; provide updated information to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.24 Identify (through aerial and topographic maps), and confirm through field surveys, potential vernal pools using standard protocols. Provide confirmed vernal pool locations (and when possible, a description of the pools condition) and species' presence data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.18 Conduct baseline surveys/inventories to better understand the distribution of fish and invertebrate (including freshwater mussels) populations.

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.10 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and document fish SGCN habitats by plotting their distributions in GIS and submitting the data to the State for integration into the DEP's Biotics database.

3.3.2 Monitoring

3.3.2.3 Continue to update wildlife and habitat databases and revise models of critical SGCN habitats using the most current data available and where lacking, develop new SGCN and/or habitat models as data on species habitat requirements and applicable GIS data layers become available.

Project 3. Region-based Habitat Conservation Plans: Statewide

Job 3.01. It All Adds Up: Local Actions + Regional Awareness = Regional Habitat Solutions!

Objective: Encourage municipalities to direct development in a manner that protects natural landscapes and connectivity.

Purpose: Integrate additional natural resource protection standards into local ordinances, relying upon available State mapping resources.

Benefits: Region-wide protection for wildlife SGCN, particularly upland species that are less often addressed by State regulations, using State mapping resources to provide for the accurate, consistent and uniform identification of resources or solutions.

Objective: Encourage municipalities to assess a "Habitat Conservation Fee" of all developments involving vegetation removal; the revenue from which would fund local and regional conservation efforts associated with the subject development or applied towards other local and regional conservation efforts.

Purpose: Establish a revenue source from parties benefitting from the removal or disturbance of wildlife habitats that would be dedicated to mitigating for said impacts via local or regional habitat conservation efforts.

Benefits: Region-wide protection for wildlife SGCN, particularly upland species that are less often addressed by State regulations, using State mapping resources to provide for the accurate, consistent and uniform identification of resources or solutions.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	American Woodcock	Black Rail
Black Skimmer	Blue-winged Warbler	Bobolink
Cerulean Warbler	Common Tern	Eastern Meadowlark
Forster's Tern	Golden-winged Warbler	Grasshopper Sparrow
Kentucky Warbler	Least Tern	Little Blue Heron
Northern Bobwhite	Northern Harrier	Peregrine Falcon
Pied-billed Grebe	Piping Plover	Prothonotary Warbler
Red Knot	Red-headed Woodpecker	Ruddy Turnstone
Scarlet Tanager	Snowy Egret	Tricolored Heron
Vesper Sparrow	Wood Thrush	

Fish

Alewife	Atlantic Sturgeon	Banded Sunfish

Blackbanded Sunfish	Blueback Herring	Bridle Shiner
Brook Trout	Comely Shiner	Ironcolor Shiner
Mud Sunfish	Shortnose Sturgeon	Swamp Darter

Macroinvertebrates

A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper
Ashton Cuckoo Bumble Bee	Brook Floater	Buchholz's Dart Moth
Buchholz's Gray	Carter's Noctuid Moth	Daecke's Pyralid Moth
Dotted Skipper	Dwarf Wedgemussel	Eastern Lampmussel
Frosted Elfin	Georgia Satyr	Green Floater
Hoary Elfin	Leonard's Skipper	Little White Tiger Beetle
Maritime Sunflower Borer Moth	New England Bluet	New Jersey Pine Barrens Tiger Beetle
Northeastern Beach Tiger Beetle	Northern Metalmark	Papaipema harrisii
Pine Barrens Bluet	Pink Sallow	Robust Baskettail
Rusty Patched Bumble Bee	Sand Myrtle Looper/Pink	Scarlet Bluet
Septima's Clubtail	Southeastern Beach Tiger Beetle	Southern Plains Bumble Bee
Superb Jewelwing	Triangle Floater	Variable Cuckoo Bumble Bee
Yellow Bumble Bee	Yellow Lampmussel	Yellow-banded Bumble Bee

Mammals

Allegheny Woodrat	Indiana Bat	Little Brown Bat
North Atlantic Right Whale	Northern Myotis	

Reptiles & Amphibians

Atlantic Green Turtle	Atlantic Leatherback	Atlantic Loggerhead
Atlantic Ridley	Bog Turtle	Carpenter Frog
Corn Snake	Eastern Box Turtle	Eastern Hognose Snake
Eastern Redbelly Turtle	Eastern Spadefoot	Eastern Tiger Salamander
Longtail Salamander	New Jersey Chorus Frog	Northern Black Racer
Northern Diamondback Terrapin	Northern Pine Snake	Northern Red Salamander
Northern Scarlet Snake	Pine Barrens Treefrog	Timber Rattlesnake
Wood Turtle		

Threats and Action Drivers associated with this conservation need

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale)

1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.1.1.2 Loss, alteration and/or degradation of habitat.

1.1.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.

1.1.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.

1.1.1.5 Impervious surfaces can lead to a decrease in water recharge.

1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.1.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale)

1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.2.1.2 Loss, alteration and/or degradation of habitat.

1.2.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.

1.2.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.

1.2.1.5 Impervious surfaces can lead to a decrease in water recharge.

1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.2.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale)

1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.3.1.2 Loss, alteration and/or degradation of habitat.

1.3.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.

1.3.1.4 Impervious surfaces can lead to a decrease in water recharge.

1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.3.1.6 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

3 Energy Production and Mining

3.1 Oil and Gas Facilities and Pipelines

3.1.1 Distribution processes of petroleum and other liquid hydrocarbons

3.1.1.1 Fragments terrestrial and aquatic habitats.

3.1.1.2 Loss, alteration and/or degradation of habitat.

3.1.1.3 Increased risk of oil spills.

3.1.2 Natural gas distribution processes

3.1.2.1 Fragments terrestrial and aquatic habitats.

3.1.2.2 Loss, alteration and/or degradation of habitat.

3.2 Mining and Quarrying

3.2.2 Surface Mining - Rock Quarry (and sand quarries)

3.2.2.1 Fragments terrestrial and aquatic habitats.

3.2.2.2 Loss, alteration and/or degradation of habitat.

3.3 Renewable Energy

3.3.1 Wind Power

3.3.1.2 Fragments terrestrial habitats.

3.3.1.3 Loss, alteration and/or degradation of habitat.

3.3.1.4 Increased commercial infrastructure.

3.3.2 Solar Power

3.3.2.1 Fragments terrestrial habitats.

3.3.2.2 Loss, alteration and/or degradation of habitat.

3.3.2.3 Increased commercial infrastructure.

3.4 Conventional Power Plants

3.4.0 Conventional Power Plants

3.4.0.2 Loss, alteration and/or degradation of habitat due to new or the expansion of current facilities.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale)

4.1.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species and inhibiting dispersal of non-volant animals, reducing gene flow.

4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.1.1.3 Re-establishment of abandoned railroad lines may displace wildlife, in particular, less mobile species using the area to fulfill critical life history requirements.

4.1.1.5 Re-establishment of abandoned railroad lines may decrease turtles' abilities to disperse due to their difficulty traversing the railroad ties and tracks, leading to decreased genetic exchange.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads

4.2.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species, inhibiting dispersal of non-volant animals, reducing gene flow, and creating barriers to fish when service line-associated roads cross streams (e.g., bridges, culverts, fords, etc).

4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

7 Natural Systems Modifications

7.2 Dams and Water Management/Use

7.2.2 Abstraction of Surface Water (commercial use)

7.2.2.2 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.2.4 Water intake systems associated with industrial use and power plants threaten aquatic organisms due to injury or mortality from impingement and/or entrainment.

7.2.5 Abstraction of Ground Water (domestic use)

7.2.5.1 Heavy withdrawal of ground water for domestic use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.6 Abstraction of Ground Water (commercial use)

7.2.6.1 Heavy withdrawal of ground water for industrial and commercial use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.12 Culverts

7.2.12.1 Improper design, placement, installation and maintenance of culverts and other stream crossing structures can impede or prevent the movements of terrestrial organisms and can restrict or limit stream flow, impeding the movement of aquatic organisms along riparian corridors.

7.2.13 Stream Burrial

7.2.13.1 Eliminates riparian habitats.

7.2.13.2 Eliminates in-stream habitat and water resources for wildlife.

7.2.13.3 Alters the hydrology and quality of downstream aquatic and riparian habitats.

7.3 Other Ecosystem Modifications

7.3.1 Shoreline Stabilization

7.3.1.2 Efforts to stabilize stream corridors, particularly near roads and infrastructure, in which vegetated and dynamic shorelines are replaced with unvegetated and rigid structures such as rip-rap, gabion, concrete raceways and bulkheads interfere with fish spawning, nursery and foraging areas.

7.3.5 Poor habitat management

7.3.5.2 Shifting from natural vegetation to lawns can cause increased temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

7.3.5.18 Lack of funding or competitive market prices to maintain native grasslands for grassland-dependent species causes conversion of fallow or hay fields to other crops or shrublands.

9 Pollution

9.1 Domestic and Urban Waste Water

9.1.1 Sewage

9.1.1.1 Degradation of aquatic and marine water quality and habitats by changing turbidity, flow and water chemistry.

9.1.1.2 Leads to increased eutrophication and algae blooms that result in oxygen depletion.

9.1.1.3 Contaminants in sewage treatment effluents and Combined Sewer Overflows can cause developmental and behavioral abnormalities and reproductive failure in wildlife.

9.1.2 Run-off

9.1.2.1 Chemical fertilizers and nutrient run-off changes the pH in streams and ponds and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.1.2.2 Contaminants degrade aquatic and marine water quality and can bioaccumulate in benthic organisms, threatening wildlife by causing developmental and behavioral abnormalities and reproductive failure.

9.1.2.3 Contaminants from road runoff (oil, sediment, salt, etc.) impact native vegetation and the species that rely upon them, degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.6 Excess Energy

9.6.1 Light Polution

9.6.1.1 Artificial lighting can reduce suitability of adjacent habitat for species sensitive to artificial lights by disorienting wildlife, reducing foraging suitability or success, or increasing visibility to predators, resulting in reduced diversity and/or productivity of species in adjacent habitat.

9.6.2 Thermal Pollution

9.6.2.2 Water temperature changes to aquatic systems can deter or preclude use by SGCN (e.g., alter habitat suitability for wildlife species, reduce prey base) or present stressors that are harmful if not fatal to wildlife.

9.6.3 Noise Pollution

9.6.3.1 Acute and chronic noise pollution in and adjacent to terrestrial and aquatic (marine and freshwater) environments could disrupt normal behaviors of wildlife such as migration, communication, feeding, eluding predators, resting and breeding, etc.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.1 Enhance critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates through incentive programs with adjacent private landowners to increase the effective size of the habitat.

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.4 Secure and promote the protection, restoration, and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts through incentive programs.

1.2.1.5 Secure and promote the protection/restoration of critical SGCN forested habitat and minimize forest edge to benefit interior forest and disturbance-sensitive SGCN through incentive programs.

1.2.1.6 Secure and promote the protection/restoration of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers through incentive programs.

1.2.1.7 Secure and promote the protection/restoration of fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.9 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing Forestry Stewardship Programs.

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.12 Create incentives (non-monetary and/or monetary) for land developers to redevelop abandoned areas (e.g., shopping centers, office complexes) to minimize the loss of natural habitats and reduce the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

1.2.1.18 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and land managers to control and reduce the impacts of invasive, native and non-native species in order to increase structural habitat diversity.

1.2.1.20 Coordinate across government agencies and non-government organizations to create or expand upon tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMP's.

1.2.1.21 Create and/or support market-based programs that subsidize or create branding for products derived sustainably from managed wildlife habitats.

1.2.1.22 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to horse/livestock farm owners and managers to increase structural habitat diversity in and around the farms by managing vegetation for a variety of species, in particular, farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

1.2.1.23 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to provide cost shares and/or plan approvals for management based on management approaches and prescriptions.

1.2.1.24 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners, with habitat of suitable patch size to support breeding grassland-dependent species, to alter the timing of vegetation management to benefit grassland and pollinator species.

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

1.2.1.28 Create incentives to implement dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

2 Direct Management of Natural Resources

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and the SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.5 Develop a plan that directs the creation or expansion of energy or utility rights-of-way in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.6 Develop a plan that directs the creation or expansion of roads and railroads or the re-establishment of abandoned railroads within and adjacent to critical forested habitats in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.8 Develop a plan that focuses on strategies for oil pipelines to avoid sensitive habitats that would be highly impacted by oil spills.

9.1.0.9 Develop a plan that focuses on strategies to minimize the creation of renewable energy farms (e.g., solar, wind) and related infrastructures within and their impacts on forested habitats and the wildlife community.

9.1.0.10 Develop a plan that focuses on strategies to minimize the impacts of mining on critical forested habitats.

9.1.0.11 Develop a plan that focuses on strategies to minimize the impacts of power plants on critical forested habitats and the wildlife community.

9.1.0.14 Develop a plan to minimize development that would result in groundwater withdrawal in critical forested areas.

9.1.0.15 Develop a plan to minimize fragmentation of terrestrial and aquatic habitats by roads.

9.1.0.16 Develop a plan to minimize new lawnscapes and preserve natural vegetation within and adjacent to critical forest areas.

9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.23 Develop a plan to mitigate the effects of transportation barriers by using CHANJ products.

9.1.0.27 Develop a plan to use wildlife-appropriate culverts in critical forested areas.

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

100 Law and Policy

100.3 State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.48 Propose new State law or regulation mandating that a State-level "development impact fee" be assessed on all new development approved by municipalities (via the Municipal Land Use Law processes), and dedicate such monies to the development and implementation of regional Habitat Conservation Plans (or existing plans/programs serving the same regional function).

Project 4. Climate Change Impacts to New Jersey Wildlife and Residents

Job 4.01. Rising Waters…It's a Thing!

Objective: Increase public awareness, in particular of coastal-dwelling residents, regarding the realities of sea-level rise. This should include how it will impact citizens and the decisions they, along with society/government agencies, need to make to address coastal changes. Provide alternate solutions such as hard versus soft stabilization techniques that can benefit wildlife and residential retreat (through the Blue Acres Program) to allow for natural processes to occur.

Purpose: Alter strategies regarding coastal/shoreline management to implement measures that will minimize its impact and still allow for natural processes (e.g., inlets shifting, barrier islands and marsh islands shifting) to occur that will benefit coastal wildlife species.

Benefits: There may be more capacity for natural processes to occur that benefit species as people accept the realities of sea-level rise (namely, the difficulty and cost of stabilizing shorelines to keep pace with rising waters). The public may see a benefit in expending less effort and funds on tasks with diminishing returns.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	Black Rail	Black Skimmer
Common Tern	Forster's Tern	Least Tern
Little Blue Heron	Pied-billed Grebe	Piping Plover
Red Knot	Ruddy Turnstone	Snowy Egret
Tricolored Heron		

Fish

Alewife	Atlantic Sturgeon	Blueback Herring
Shortnose Sturgeon		

Macroinvertebrates

Little White Tiger Beetle	Northeastern Beach Tiger Beetle	Southeastern Beach Tiger Beetle

Mammals

North Atlantic Right Whale

Reptiles & Amphibians

Atlantic Green Turtle	Atlantic Leatherback	Atlantic Loggerhead
Atlantic Ridley	Northern Diamondback Terrapin	

Threats and Action Drivers associated with this conservation need

7 Natural Systems Modifications

7.3 Other Ecosystem Modifications

7.3.1 Shoreline Stabilization

7.3.1.1 Efforts to stabilize barrier islands and shorelines, including jetties, groins, bulkheads, interfere with the natural geological processes needed to create and maintain high quality habitat for beach strand species.

11 Climate Change and Severe Weather

11.4 Storms and Flooding

11.4.1 Storms and flooding

11.4.1.7 Potentially damage coastal habitats, including beach and marsh habitats used by spawning horseshoe crabs, nesting diamondback terrapins, and resting and foraging birds.

11.5 Sea-level Rise

11.5.0 Sea-level Rise

11.5.0.4 Increased erosion of beach, mudflat and marsh habitats critical for a number of coastal species to fulfill life history requirements.

11.5.0.6 Alters salinity conditions in back bays and tidal creeks, thereby impacting food availability, composition and abundance for wildlife.

11.5.0.7 Sea level rise exacerbates marsh loss caused by prior human manipulations (e.g., impoundments, grid-ditching) that reduced the elevation of the marsh.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats

14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

4 Education

4.1 Educator/Instructor training

4.1.0 Public education

4.1.0.1 Provide educational resources and training programs to private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

4.1.1 Aquatic resource education

4.1.1.1 Provide educational resources and training programs to teachers in aquatic resource education that includes information regarding climate change and sea-level rise for incorporation into the class curriculum and/or as the focus of school field trips.

4.1.1.2 Provide educational resources and training programs to teachers in aquatic resource education that includes information regarding how coastal stabilization negatively impacts wildlife by preventing natural processes for incorporation into the class curriculum and/or as the focus of school field trips.

8 Outreach

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.21 Develop an educational outreach program for the general public, in particular those within and adjacent to coastal and riparian areas on the realities of sea-level rise to help citizens living in these areas understand how this will affect them, how coastal stabilization negatively impacts wildlife by preventing natural processes, and how their decisions impact species.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

Job 4.02. Modeling the Impacts of Climate Change to Identify Threatened Wildlife Habitats

Objective: Identify coastal habitats most vulnerable to sea level rise, severe storms, and flooding.

Purpose: Obtain information that can guide habitat management strategies and land acquisition priorities that enable beach and dune species to increase resiliency to the impacts of climate change and severe weather.

Benefits: Develop a greater understanding of threats from global climate change to species and habitat.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	Black Skimmer	Common Tern
Least Tern	Northern Harrier	Piping Plover
Red Knot	Ruddy Turnstone	

Fish

Alewife	Atlantic Sturgeon	Banded Sunfish
Blackbanded Sunfish	Blueback Herring	Bridle Shiner
Comely Shiner	Ironcolor Shiner	Mud Sunfish
Shortnose Sturgeon	Swamp Darter	

Macroinvertebrates

Brook Floater	Dwarf Wedgemussel	Eastern Lampmussel
Green Floater	Little White Tiger Beetle	New England Bluet
Northeastern Beach Tiger Beetle	Pine Barrens Bluet	Robust Baskettail
Scarlet Bluet	Septima's Clubtail	Southeastern Beach Tiger Beetle
Superb Jewelwing	Triangle Floater	Yellow Lampmussel

Threats and Action Drivers associated with this conservation need

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory

12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.2 Lack of up-to-date existing information

12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

3 Data Collection and Analysis

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.16 Gather "best information" for spatial modeling and update/create a current model/depiction of anticipated habitat shifts from sea-level rise, flooding, etc.

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.1.28 Identify key habitats for the potential allowance of natural coastal processes without interfering through shoreline stablization, etc. and evaluate the risks and benefits if coastal migration was permitted to occur naturally. Create a GIS map of the identified areas; provide the assessment and mapping to local towns and other appropriate governing agencies.

3.3.2 Monitoring

3.3.2.20 Once a system is developed for reporting and qualifying new locations of invasive species, develop, implement and monitor/evaluate invasive species removal strategies at identified locations. Priority should be given to those areas critical to SGCN and/or contain unique and/or rare plant communities supporting SGCN and/or other fish/wildlife species.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

Job 4.03. Reducing the Impacts of Climate Change on Wildlife, their Habitat and New Jersey's Residents through the Blue Acres Land Acquisition Program

Objective: Allow indigenous fauna and flora to establish in coastal habitats by relocating people and structures, and/or dismantling or abandoning infrastructure from floodprone areas of the state, where appropriate. Such action will also minimize future repetitive insurance claims by landowners as a result of storm-caused destruction to their property and eliminate repeated and costly attempts to rebuild in the same area.

Purpose: Restore the natural landscape and biodiversity of the coast and to minimize, if not eliminate, future repeated financial losses and claims by coastal landowers and businesses residing in the identified flood area by purchasing these properties (from willing sellers only) through the state's Blue Acres land acquisition program.

Benefits: Provides financial incentive and/or compensation for those landowners whose properties and infrastructure have become too vulnerable to sea-level rise and the threat of severe storms while providing an opportunity for wildlife species to occupy previously unavailable habitat.

Focal wildlife species benefitting from this job

Birds

Black Rail	Black Skimmer	Northern Harrier

Fish

Alewife	Atlantic Sturgeon	Blueback Herring
Shortnose Sturgeon		

Macroinvertebrates

Little White Tiger Beetle	Northeastern Beach Tiger Beetle	Southeastern Beach Tiger Beetle

Threats and Action Drivers associated with this conservation need

7 Natural Systems Modifications

7.3 Other Ecosystem Modifications

7.3.1 Shoreline Stabilization

7.3.1.1 Efforts to stabilize barrier islands and shorelines, including jetties, groins, bulkheads, interfere with the natural geological processes needed to create and maintain high quality habitat for beach strand species.

11 Climate Change and Severe Weather

11.4 Storms and Flooding

11.4.1 Storms and flooding

11.4.1.1 Extreme storms and flooding events threaten aquatic and marine wildlife through habitat degradation and alteration, including alterations to off-shore or back-bay benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic and marine wildlife.

11.4.1.4 Flood events alter river or stream morphology, benthic conditions and habitat availability for wildlife, cause bank erosion, and deposit sediments in floodplain wetlands altering wildlife habitat.

11.4.1.6 Increased storms and flooding reduce nesting success, especially for ground-nesting birds.

11.4.1.7 Potentially damage coastal habitats, including beach and marsh habitats used by spawning horseshoe crabs, nesting diamondback terrapins, and resting and foraging birds.

11.4.2 Increased rainfall

11.4.2.3 More frequent rain events can alter terrestrial and wetland vegetation communities as well as wetland hydrology, shifting wildlife community use.

11.5 Sea-level Rise

11.5.0 Sea-level Rise

11.5.0.4 Increased erosion of beach, mudflat and marsh habitats critical for a number of coastal species to fulfill life history requirements.

11.5.0.6 Alters salinity conditions in back bays and tidal creeks, thereby impacting food availability, composition and abundance for wildlife.

11.5.0.7 Sea level rise exacerbates marsh loss caused by prior human manipulations (e.g., impoundments, grid-ditching) that reduced the elevation of the marsh.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

6 Land and Water Rights Acquisition and Protection

6.1 Land acquisition

6.1.1 Fee title

6.1.1.1 Use state, federal, and local land acquisition programs (e.g., Green Acres, Blue Acres, etc.) to acquire abandoned or failing bay shore communities and to relocate displaced people and infrastructure.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

100 Law and Policy

100.3 State Regulations

100.3.2 State Land Acquisition Programs

100.3.2.1 Increase opportunities for habitat restoration by making any necessary policy changes to state, federal and local land acquisition programs (e.g., Green Acres, Blue Acres, etc.) to allow for acquisition within abandoned or failing bay shore communities, including mechanisms to relocate displaced people and infrastructure.

Job 4.04. Increase the Climate and Ecological Consciousness within New Jersey's Residents

Objective: Grow the consituency of NJ residents who have an elevated ecological and climate consciousness through the use of social media campaigns and widespread access to resources for training and education.

Purpose: Create an ecologically-knowledgeable and responsive residential population and engage them in wildlife conservation as it relates to climate change.

Benefits: An increased population of citizens armed with an understanding of climate change and the impacts it has on wildlife. This may lead to a reduction of threats on SGCN through the political activism of an informed citizenry.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	American Woodcock	Black Rail
Black Skimmer	Blue-winged Warbler	Bobolink
Cerulean Warbler	Common Tern	Eastern Meadowlark
Forster's Tern	Golden-winged Warbler	Grasshopper Sparrow
Kentucky Warbler	Least Tern	Little Blue Heron
Northern Bobwhite	Northern Harrier	Peregrine Falcon

Pied-billed Grebe	Piping Plover	Prothonotary Warbler
Red Knot	Red-headed Woodpecker	Ruddy Turnstone
Scarlet Tanager	Snowy Egret	Tricolored Heron
Vesper Sparrow	Wood Thrush	

Fish

Alewife	Atlantic Sturgeon	Banded Sunfish
Blackbanded Sunfish	Blueback Herring	Bridle Shiner
Brook Trout	Comely Shiner	Ironcolor Shiner
Mud Sunfish	Shortnose Sturgeon	Swamp Darter

Macroinvertebrates

A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper
Ashton Cuckoo Bumble Bee	Brook Floater	Buchholz's Dart Moth
Buchholz's Gray	Carter's Noctuid Moth	Daecke's Pyralid Moth
Dotted Skipper	Dwarf Wedgemussel	Eastern Lampmussel
Frosted Elfin	Georgia Satyr	Green Floater
Hoary Elfin	Leonard's Skipper	Little White Tiger Beetle
Maritime Sunflower Borer Moth	New England Bluet	New Jersey Pine Barrens Tiger Beetle
Northeastern Beach Tiger Beetle	Northern Metalmark	Papaipema harrisii
Pine Barrens Bluet	Pink Sallow	Robust Baskettail
Rusty Patched Bumble Bee	Sand Myrtle Looper/Pink	Scarlet Bluet
Septima's Clubtail	Southeastern Beach Tiger Beetle	Southern Plains Bumble Bee
Superb Jewelwing	Triangle Floater	Variable Cuckoo Bumble Bee
Yellow Bumble Bee	Yellow Lampmussel	Yellow-banded Bumble Bee

Mammals

Allegheny Woodrat	Indiana Bat	Little Brown Bat
North Atlantic Right Whale	Northern Myotis	

Reptiles & Amphibians

Atlantic Green Turtle	Atlantic Leatherback	Atlantic Loggerhead
Atlantic Ridley	Bog Turtle	Carpenter Frog
Corn Snake	Eastern Box Turtle	Eastern Hognose Snake

Eastern Redbelly Turtle	Eastern Spadefoot	Eastern Tiger Salamander
Longtail Salamander	New Jersey Chorus Frog	Northern Black Racer
Northern Diamondback Terrapin	Northern Pine Snake	Northern Red Salamander
Northern Scarlet Snake	Pine Barrens Treefrog	Timber Rattlesnake
Wood Turtle		

Threats and Action Drivers associated with this conservation need

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats

14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

4 Education

4.1 Educator/Instructor training

4.1.1 Aquatic resource education

4.1.1.1 Provide educational resources and training programs to teachers in aquatic resource education that includes information regarding climate change and sea-level rise for incorporation into the class curriculum and/or as the focus of school field trips.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.21 Develop an educational outreach program for the general public, in particular those within and adjacent to coastal and riparian areas on the realities of sea-level rise to help citizens living in these areas understand how this will affect them, how coastal stabilization negatively impacts wildlife by preventing natural processes, and how their decisions impact species.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

100 Law and Policy

100.4 State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.2 Create a policy that requires the NJ DEP to incorporate scientific information regarding climate change and sea level rise (e.g., predictions, habitat management/acquisition efforts to enhance resilience to inundation) on their websites and to work with other government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

Project 5. Barriers to Conservation Efforts

Job 5.01. Remove Barriers on Habitat Management through Data Sharing

Objective: Coordinate habitat management and enhancement efforts and planning within State Agencies by sharing plant and wildlife species distribution and habitat data.

Purpose: Provide a more comprehensive understanding of the State's important habitats for SGCN for planning and implementation of habitat management efforts.

Benefits: Increased collaboration and awareness of concerns among individually-charged resource protection or management agencies, resulting in a more holistic approach to habitat management and enhancement.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	American Woodcock	Black Rail
Black Skimmer	Blue-winged Warbler	Bobolink
Cerulean Warbler	Common Tern	Eastern Meadowlark
Forster's Tern	Golden-winged Warbler	Grasshopper Sparrow
Kentucky Warbler	Least Tern	Little Blue Heron
Northern Bobwhite	Northern Harrier	Peregrine Falcon
Pied-billed Grebe	Piping Plover	Prothonotary Warbler
Red Knot	Red-headed Woodpecker	Ruddy Turnstone
Scarlet Tanager	Snowy Egret	Tricolored Heron
Vesper Sparrow	Wood Thrush	

Fish

Alewife	Atlantic Sturgeon	Banded Sunfish
Blackbanded Sunfish	Blueback Herring	Bridle Shiner
Brook Trout	Comely Shiner	Ironcolor Shiner
Mud Sunfish	Shortnose Sturgeon	Swamp Darter

Macroinvertebrates

A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper
Ashton Cuckoo Bumble Bee	Brook Floater	Buchholz's Dart Moth
Buchholz's Gray	Carter's Noctuid Moth	Daecke's Pyralid Moth

Dotted Skipper	Dwarf Wedgemussel	Eastern Lampmussel
Frosted Elfin	Georgia Satyr	Green Floater
Hoary Elfin	Leonard's Skipper	Little White Tiger Beetle
Maritime Sunflower Borer Moth	New England Bluet	New Jersey Pine Barrens Tiger Beetle
Northeastern Beach Tiger Beetle	Northern Metalmark	Papaipema harrisii
Pine Barrens Bluet	Pink Sallow	Robust Baskettail
Rusty Patched Bumble Bee	Sand Myrtle Looper/Pink	Scarlet Bluet
Septima's Clubtail	Southeastern Beach Tiger Beetle	Southern Plains Bumble Bee
Superb Jewelwing	Triangle Floater	Variable Cuckoo Bumble Bee
Yellow Bumble Bee	Yellow Lampmussel	Yellow-banded Bumble Bee

Mammals

Allegheny Woodrat	Indiana Bat	Little Brown Bat
North Atlantic Right Whale	Northern Myotis	

Reptiles & Amphibians

Atlantic Green Turtle	Atlantic Leatherback	Atlantic Loggerhead
Atlantic Ridley	Bog Turtle	Carpenter Frog
Corn Snake	Eastern Box Turtle	Eastern Hognose Snake
Eastern Redbelly Turtle	Eastern Spadefoot	Eastern Tiger Salamander
Longtail Salamander	New Jersey Chorus Frog	Northern Black Racer
Northern Diamondback Terrapin	Northern Pine Snake	Northern Red Salamander
Northern Scarlet Snake	Pine Barrens Treefrog	Timber Rattlesnake
Wood Turtle		

Threats and Action Drivers associated with this conservation need

12 Resource Management Needs

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform

12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

Conservation actions that address Threats and Action Drivers

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.6 Engage government agencies, conservation partners and other stakeholders in discussions focused on sharing information regarding coastal and marine critical wildlife habitats, developing comprehensive mapping to assist in reducing impacts of energy production activities, and establishing a long-term monitoring program to update the data. Ensure this information is available to appropriate personnel for planning or response measures.

100 Law and Policy

100.3 State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

Job 5.02. Remove Regulatory Barriers on Habitat Enhancement Projects

Objective: Where appropriate, remove regulatory barriers for voluntarily implementing habitat creation and enhancement projects by updating the NJ DEP's permit process (e.g., allow projects to be completed under "Permit by Rule" rather than General permit or Individual Permits with associated administrative requirements, reduce or eliminate fees, etc.).

Purpose: Promote and support habitat enhancement efforts rather than deter those willing to do the work.

Benefits: Reduced administrative burden for both applicant(s) and regulatory program staff (spend less time on permit application paperwork/less time reviewing beneficial projects with de minimis impacts) that could promote increased voluntary project participation and make such projects more affordable for landowners.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	American Woodcock	Black Rail
Black Skimmer	Blue-winged Warbler	Bobolink
Cerulean Warbler	Common Tern	Eastern Meadowlark
Forster's Tern	Golden-winged Warbler	Grasshopper Sparrow
Kentucky Warbler	Least Tern	Little Blue Heron
Northern Bobwhite	Northern Harrier	Peregrine Falcon
Pied-billed Grebe	Piping Plover	Prothonotary Warbler

Red Knot	Red-headed Woodpecker	Ruddy Turnstone
Scarlet Tanager	Snowy Egret	Tricolored Heron
Vesper Sparrow	Wood Thrush	

Fish

Alewife	Atlantic Sturgeon	Banded Sunfish
Blackbanded Sunfish	Blueback Herring	Bridle Shiner
Brook Trout	Comely Shiner	Ironcolor Shiner
Mud Sunfish	Shortnose Sturgeon	Swamp Darter

Macroinvertebrates

A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper
Ashton Cuckoo Bumble Bee	Brook Floater	Buchholz's Dart Moth
Buchholz's Gray	Carter's Noctuid Moth	Daecke's Pyralid Moth
Dotted Skipper	Dwarf Wedgemussel	Eastern Lampmussel
Frosted Elfin	Georgia Satyr	Green Floater
Hoary Elfin	Leonard's Skipper	Little White Tiger Beetle
Maritime Sunflower Borer Moth	New England Bluet	New Jersey Pine Barrens Tiger Beetle
Northeastern Beach Tiger Beetle	Northern Metalmark	Papaipema harrisii
Pine Barrens Bluet	Pink Sallow	Robust Baskettail
Rusty Patched Bumble Bee	Sand Myrtle Looper/Pink	Scarlet Bluet
Septima's Clubtail	Southeastern Beach Tiger Beetle	Southern Plains Bumble Bee
Superb Jewelwing	Triangle Floater	Variable Cuckoo Bumble Bee
Yellow Bumble Bee	Yellow Lampmussel	Yellow-banded Bumble Bee

Mammals

Allegheny Woodrat	Indiana Bat

Reptiles & Amphibians

Bog Turtle	Carpenter Frog	Corn Snake
Eastern Box Turtle	Eastern Hognose Snake	Eastern Redbelly Turtle
Eastern Spadefoot	Eastern Tiger Salamander	Longtail Salamander
New Jersey Chorus Frog	Northern Black Racer	Northern Diamondback Terrapin
Northern Pine Snake	Northern Red Salamander	Northern Scarlet Snake

Pine Barrens Treefrog | Timber Rattlesnake | Wood Turtle

Threats and Action Drivers associated with this conservation need

12 Resource Management Needs

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms

12.3.0.10 Land use regulatory processes pertaining to habitat creation, enhancement or restoration projects can be costly and/or burdensome, precluding or discouraging the development or implementation of conservation projects.

Conservation actions that address Threats and Action Drivers

100 Law and Policy

100.3 State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.43 Identify and address (amend) regulatory impediments to beneficial habitat management.

Project 6. Coastal and Shoreline Stabilization

Job 6.01. Responsive Shoreline Stabilization

Objective: Identify important areas where soft stabilization techniques should replace the use of hard structures to prevent or reduce negative impacts on threatened resources and ecosystems.

Purpose: Increase the use of soft stabilization techniques to enhance nesting habitat and remove hard structures to reduce the risk of impingement.

Benefits: Improved and/or enhanced use of habitats shaped by soft stabilization by diamondback terrapin and other near-shore coastal species.

Objective: Allow natural processes to take place in conserved coastal areas. Perform habitat management in areas where natural processes may be stymied by stabilization efforts.

Purpose: Restore and/or maintain the natural landscape and biodiversity of the coast.

Benefits: Increased opportunities for wildlife that depends upon natural processes to shape their environment.

Focal wildlife species benefitting from this job

Fish

Alewife | Atlantic Sturgeon | Blueback Herring

Shortnose Sturgeon

Mammals

North Atlantic Right Whale

Reptiles & Amphibians

Atlantic Green Turtle | Atlantic Leatherback | Atlantic Loggerhead

Atlantic Ridley | Northern Diamondback Terrapin

Threats and Action Drivers associated with this conservation need

7 Natural Systems Modifications

7.3 Other Ecosystem Modifications

7.3.1 Shoreline Stabilization

7.3.1.3 Efforts to stabilize barrier islands and shorelines, including jetties, groins, and bulkheads, degrade foraging areas for migrating whales and sea turtles.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations

11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.4 Storms and Flooding

11.4.1 Storms and flooding

11.4.1.1 Extreme storms and flooding events threaten aquatic and marine wildlife through habitat degradation and alteration, including alterations to off-shore or back-bay benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic and marine wildlife.

11.4.1.2 Potentially damage coastal habitats, including beach- and marsh-nesting bird habitats and interdunal wetlands, and can increase marsh erosion.

11.4.1.3 Increase risk of saltwater intrusion to freshwater habitats altering the water chemistry and potentially altering aquatic wildlife community.

11.4.1.4 Flood events alter river or stream morphology, benthic conditions and habitat availability for wildlife, cause bank erosion, and deposit sediments in floodplain wetlands altering wildlife habitat.

11.4.1.5 Storm damage can alter forest structure via blow-downs or micro-bursts, and can destroy bird nesting in the locales where the storms occur.

11.4.1.6 Increased storms and flooding reduce nesting success, especially for ground-nesting birds.

11.4.2 Increased rainfall

11.4.2.1 Extreme rain events threaten aquatic wildlife through habitat degradation and alteration, including alterations to benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic wildlife.

11.4.2.2 Extreme rain events can damage wildlife nesting and resting habitats, including impacts to avian eggs and chick and small mammal survivorship.

11.4.2.3 More frequent rain events can alter terrestrial and wetland vegetation communities as well as wetland hydrology, shifting wildlife community use.

11.5 Sea-level Rise

11.5.0 Sea-level Rise

11.5.0.1 Contributes to the conversion of high salt marsh to low salt marsh, threatening species that depend on high marsh habitat and those dependent on the marsh-upland ecotone.

11.5.0.2 Increased risk of saltwater intrusion into freshwater systems impacting associated wildlife and native vegetation.

11.5.0.3 Alters salinity conditions; increased salinity will alter and degrade aquatic ecosystems, threatening anadromous species by shifting normal breeding areas upstream into potentially unsuitable areas, and causing mortality to salt-intolerant mussels and other species by inundating areas of the lower Delaware River and tributaries.

11.5.0.4 Increased erosion of beach, mudflat and marsh habitats critical for a number of coastal species to fulfill life history requirements.

11.5.0.5 Sea-level rise will result in the conversion of some upland habitats to tidal marshes impacting the species that rely upon those upland areas.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory

12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.2 Lack of up-to-date existing information

12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.3 Secure and promote the protection/restoration of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through incentive programs.

2 Direct Management of Natural Resources

2.9 Living shorelines

2.9.1 Beach renourishment

2.9.1.8 Minimize habitat loss of critical coastal beach habitats that provide nesting, migrating, and wintering areas for birds and other coastal species by maintaining or enhancing these areas through beach renourishment.

2.9.1.16 Prevent or ameliorate near-term impacts of climate change throughout the State but in particular within the coastal and Delaware Bay areas by implementing habitat management strategies that will establish/improve habitat resilience, such as beach renourishment, that benefits wildlife inhabiting these areas.

2.9.3 Sand dune restoration

2.9.3.1 Prevent or ameliorate near-term impacts of climate change throughout the State but in particular within the coastal and Delaware Bay areas by implementing habitat management strategies that will establish/improve habitat resilience, such as sand dune restoration, that benefits wildlife inhabiting these areas.

2.9.3.6 Minimize habitat loss of critical coastal dune habitats that provide nesting, migrating, and wintering areas for birds and other coastal species by maintaining or enhancing these areas through sand dune restoration.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.10 Minimize the loss of important habitats (e.g., coastal scrub-shrub and grassy habitats, high and low marsh habitats, etc.) that provide nesting, migrating, and wintering areas for SGCN birds and other coastal and marsh-dependent species through habitat restoration efforts.

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.6 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.11.0.9 Minimize habitat loss of critical coastal habitats that provide nesting, migrating, and wintering areas for birds and other coastal species by maintaining or enhancing these areas through vegetation management.

2.12 Water management

2.12.2 Diversion/headgate

2.12.2.1 Prevent or ameliorate near-term impacts of climate change throughout the State but in particular within the coastal and Delaware Bay areas by implementing habitat management strategies that will establish/improve habitat resilience, such as using diversions, that benefits wildlife inhabiting these areas.

2.12.3 Drainage

2.12.3.2 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) such as removing drainage ditches to restore natural stream flows and wetlands, that benefit wildlife inhabiting these areas.

2.12.3.7 Minimize habitat loss of critical coastal habitats that provide nesting, migrating, and wintering areas for birds and other coastal species by maintaining or enhancing these areas by removing drainage ditches.

2.12.6 Tide gate

2.12.6.1 Prevent or ameliorate near-term impacts of climate change throughout the State but in particular within the coastal and Delaware Bay areas by implementing habitat management strategies that will establish/improve habitat resilience, such as tide gates, that benefits wildlife inhabiting these areas.

2.12.7 Waterfowl impoundment maintenance

2.12.7.4 Prevent or ameliorate near-term impacts of climate change throughout the State but in particular within the coastal and Delaware Bay areas by implementing habitat management strategies that will establish/improve habitat resilience, such as impoundment management, that benefits wildlife inhabiting these areas.

2.12.7.9 Minimize habitat loss of critical coastal habitats in Delaware Bay that provide nesting, migrating, and wintering areas for birds and other coastal species by maintaining or enhancing these areas through impoundment management.

2.12.8 Watering facilities

2.12.8.1 Install water control structures to reduce the impact of excessive salt water flooding to particularly vulnerable high marsh habitats.

2.12.8.2 Manage water levels in impoundments to improve coastal marsh habitat availability to wildlife and improve resiliency of the marshes to sea level rise.

3 Data Collection and Analysis

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.16 Gather "best information" for spatial modeling and update/create a current model/depiction of anticipated habitat shifts from sea-level rise, flooding, etc.

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.1.28 Identify key habitats for the potential allowance of natural coastal processes without interfering through shoreline stablization, etc. and evaluate the risks and benefits if coastal migration was permitted to occur naturally. Create a GIS map of the identified areas; provide the assessment and mapping to local towns and other appropriate governing agencies.

3.3.2 Monitoring

3.3.2.20 Once a system is developed for reporting and qualifying new locations of invasive species, develop, implement and monitor/evaluate invasive species removal strategies at identified locations. Priority should be given to those areas critical to SGCN and/or contain unique and/or rare plant communities supporting SGCN and/or other fish/wildlife species.

3.3.2.22 Conduct short- and long-term monitoring of the current natural processes affecting sediment transport along the coast. Share findings with organizations/agencies attempting to design beach nourishment projects in a manner that will be beneficial to wildlife.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.5 Secure and protect critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.5 Promote the protection of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through conservation area designations.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.6 Engage government agencies, conservation partners and other stakeholders in discussions focused on sharing information regarding coastal and marine critical wildlife habitats, developing comprehensive mapping to assist in reducing impacts of energy production activities, and establishing a long-term monitoring program to update the data. Ensure this information is available to appropriate personnel for planning or response measures.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

100 Law and Policy

100.1 Legislation

100.1.4 County and Local

100.1.4.8 Secure critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through local ordinances.

100.3 State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.2 Improve policies/regulations aimed at protecting and preserving critical coastal and marsh habitats and securing mitigation for losses that create an environmental benefit.

100.3.0.7 Amend current policies and/or regulations to increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

100.3.0.23 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.59 Develop regulations that when implemented will increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

Job 6.02. Enlightened Coastal Stabilization: Identify Focal Areas

Project 6. Coastal and Shoreline Stabilization

Objective: Identify the best extant habitats that have not yet been impacted or only minimally impacted by stabilization. Use these as a guide to prioritize the reduction of impacts to adjacent developed habitats and/or the associated hard structure stabilization projects.

Purpose: Minimize the impacts of stabilization projects on coastal SGCN and their habitats by identifying focal areas critical to their survival and success.

Benefits: Reduce the threat of unintended negative impacts from stabilization projects on critical habitats and identifies areas where guidance can be provided to towns and landowners regarding how soft and hard stabilization efforts might impact adjacent sensitive habitat.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	Black Rail	Black Skimmer
Common Tern	Forster's Tern	Least Tern
Little Blue Heron	Northern Harrier	Piping Plover
Red Knot	Ruddy Turnstone	Snowy Egret
Tricolored Heron		

Reptiles & Amphibians

Northern Diamondback Terrapin

Threats and Action Drivers associated with this conservation need

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory

12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.2 Lack of up-to-date existing information

12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

Conservation actions that address Threats and Action Drivers

3 Data Collection and Analysis

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.16 Gather "best information" for spatial modeling and update/create a current model/depiction of anticipated habitat shifts from sea-level rise, flooding, etc.

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.1.28 Identify key habitats for the potential allowance of natural coastal processes without interfering through shoreline stablization, etc. and evaluate the risks and benefits if coastal migration was permitted to occur naturally. Create a GIS map of the identified areas; provide the assessment and mapping to local towns and other appropriate governing agencies.

3.3.1.29 Identify coastal wildlife habitats unimpacted by development and/or at greatest risk of habitat loss to help guide enlightened coastal stabilization efforts (i.e., use of soft stabilization) to reduce the impacts on wildlife and their habitats.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.20 Organize a small focal group of government and non-government agencies/organizations responsible for decisions regarding beach/dune management to share and coordinate their goals so that comprehensive planning can attempt to meet all needs.

Job 6.03. Enlightened Coastal Stabilization: Sediment Transport Strategy

Objective: Design beach nourishment projects whose implementation takes into account the redistribution of sand, which can either feed or starve conservation areas for migratory and nesting shorebirds. Focus on areas identified through Job 6.2 by monitoring and assessing the current natural processes affecting sediment.

Purpose: Enhance and maintain critical habitat for nesting and migrant shorebirds by understanding and incorporating impacts of local currents and the long-shore transport of sediment from beach nourishments.

Benefits: Benefits include habitat improvements and sustaining natural resources critical for developing and maintaining habitat by harnessing the potential of projects that are unrelated to wildlife conservation as a primary goal.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	Black Rail	Black Skimmer
Common Tern	Forster's Tern	Least Tern
Little Blue Heron	Northern Harrier	Piping Plover
Red Knot	Ruddy Turnstone	Snowy Egret
Tricolored Heron		

Reptiles & Amphibians

Northern Diamondback Terrapin

Threats and Action Drivers associated with this conservation need

7 Natural Systems Modifications

7.3 Other Ecosystem Modifications

7.3.1 Shoreline Stabilization

7.3.1.1 Efforts to stabilize barrier islands and shorelines, including jetties, groins, bulkheads, interfere with the natural geological processes needed to create and maintain high quality habitat for beach strand species.

11 Climate Change and Severe Weather

11.5 Sea-level Rise

11.5.0 Sea-level Rise

11.5.0.4 Increased erosion of beach, mudflat and marsh habitats critical for a number of coastal species to fulfill life history requirements.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.2 Lack of up-to-date existing information

12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform

12.4.0.6 Techniques for ecological management or restoration of shorelines are not fully developed or evaluated for effectiveness for target and non-target SGCN in coastal areas.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

Conservation actions that address Threats and Action Drivers

3 Data Collection and Analysis

3.3 Research, survey or monitoring - habitat

3.3.2 Monitoring

3.3.2.22 Conduct short- and long-term monitoring of the current natural processes affecting sediment transport along the coast. Share findings with organizations/agencies attempting to design beach nourishment projects in a manner that will be beneficial to wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.20 Organize a small focal group of government and non-government agencies/organizations responsible for decisions regarding beach/dune management to share and coordinate their goals so that comprehensive planning can attempt to meet all needs.

9 Planning

9.3 Species and habitat management planning

9.3.3 Habitat management planning

9.3.3.13 Develop a management plan that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas and prevents or ameliorates near-term impacts of climate change throughout the State, but in particular within the coastal and Delaware Bay areas.

100 Law and Policy

100.4 State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Job 6.04. Enlightened Coastal Stabilization: The Benefits of Soft Structures over Hard Structures

Objective: Educate coastal municipalities and residents to promote an understanding of the benefits of soft structures over hard structures through teaching materials to be used in conservation centers and classrooms, and by creating and installing information signs at targeted beach areas.

Purpose: Minimize impacts on wildlife and their nesting habitats by encouraging the use of soft stabilization structures over hard structures.

Benefits: Investment in structures that can help ameliorate the impacts of climate change and sea level rise while allowing flexibility to adjust to constantly changing environmental conditions and reducing impacts to wildlife.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	Black Skimmer	Common Tern
Least Tern	Northern Harrier	Peregrine Falcon
Piping Plover	Red Knot	Ruddy Turnstone

Macroinvertebrates

Little White Tiger Beetle	Northeastern Beach Tiger Beetle	Southeastern Beach Tiger Beetle

Reptiles & Amphibians

Northern Diamondback Terrapin

Threats and Action Drivers associated with this conservation need

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

Conservation actions that address Threats and Action Drivers

8 Outreach

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.23 Develop an educational outreach program for coastal municipalities and residents to promote an understanding of the benefits of soft structures over hard structures for shoreline stabilization.

11 Technical Assistance

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.27 Provide educational resources and presentations to coastal municipalities and residents to promote the understanding of the benefits of soft structures over hard structures for shoreline stabilization.

Project 7. Unify Coastal Landowners on Beach and Dune Management and Shoreline Stabilization Practices

Job 7.01. We're all in this together!

Objective: Develop model guidelines for managing beach and dune communities through cooperative efforts led by professionals. These can be created by engaging in a dialogue with beach-owning entities (public and private landowners) and organizing a focal group of a small number of decision-makers from the appropriate land-holdings to provide input.

Purpose: Enhance the creation and long-term persistence of habitats required for coastal species and minimize risks to successful nesting, such as human disturbance and predation.

Benefits: A consistent and effective approach with specific and focused prescriptions applied across the coastal landscape will protect and enhance wildlife associated with this system.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	Black Skimmer	Common Tern
Least Tern	Piping Plover	Red Knot
Ruddy Turnstone		

Macroinvertebrates

Little White Tiger Beetle	Northeastern Beach Tiger Beetle	Southeastern Beach Tiger Beetle

Reptiles & Amphibians

Northern Diamondback Terrapin

Threats and Action Drivers associated with this conservation need

6 Human Intrusions and Disturbance

6.3 Work and Other Activities

6.3.3 Other "work" unrelated to research

6.3.3.2 Intensive dune and beach management (including overuse of dune fencing, sand mining, mechanical beach raking, storm clean up), reduces foraging habitat for beach nesting and migratory shorebirds, and poses risks of injury and mortality to unfledged chicks.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory

12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats

14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.3 Secure and promote the protection/restoration of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through incentive programs.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.20 Organize a small focal group of government and non-government agencies/organizations responsible for decisions regarding beach/dune management to share and coordinate their goals so that comprehensive planning can attempt to meet all needs.

8.1.0.41 Engage beach-owning entities (e.g., government, non-government and non-profit organizations, and landowners) in a constructive dialogue to develop guidelines for management of beach/dune communities and to ensure that each group is educated and aware of the needs of the other groups.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

9.3.3 Habitat management planning

9.3.3.3 Integrate best management practices (BMPs) regarding dune and beach management into beach nesting bird management agreements with government agencies (and private landowners where necessary).

9.3.3.25 Develop a habitat management plan focused on areas important to near-shore, coastal species (e.g., herring, sturgeon, terrapin, nesting birds) that prioritizes these areas to direct resources to minimize the impacts of sea-level rise, flooding and storms (including extreme rain events) such as increased erosion of beach, mudflat and marsh habitats, and the increased risk of saltwater intrusion into freshwater habitats. Gather "best information" for spatial modeling of anticipated habitat shifts from sea-level rise, flooding, etc.

11 Technical Assistance

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.20 Provide educational resources and technical support to public and private landowners and land managers to promote the protection and/or enhancement of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN.

100 Law and Policy

100.1 Legislation

100.1.4 County and Local

100.1.4.8 Secure critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through local ordinances.

100.3 State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.7 Amend current policies and/or regulations to increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

100.3.0.59 Develop regulations that when implemented will increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

Project 8. Coastal Marsh Migration

Job 8.01. Where can they go?

Objective: Identify areas that allow for coastal marsh migration to counteract the impacts of sea level rise.

Purpose: Create resiliency for coastal marsh habitats in the face of sea level rise.

Benefits: Providing a path for marsh migration will ensure their continued presence as an important and viable landscape feature of the coastal zone.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	Black Rail	Black Skimmer
Common Tern	Forster's Tern	Least Tern
Little Blue Heron	Northern Harrier	Pied-billed Grebe
Red Knot	Ruddy Turnstone	Snowy Egret
Tricolored Heron		

Fish

Alewife	Atlantic Sturgeon	Blueback Herring
Shortnose Sturgeon		

Reptiles & Amphibians

Atlantic Green Turtle	Atlantic Leatherback	Atlantic Loggerhead
Atlantic Ridley	Northern Diamondback Terrapin	

Threats and Action Drivers associated with this conservation need

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory

12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.4 Lack of information on the morphometrics and trends of coastal salt marshes and salt marsh islands.

12.1.2 Lack of up-to-date existing information

12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

3 Data Collection and Analysis

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

3.3.1.3 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) remaining high and low marsh habitats with natural buffers and stable water levels that provide suitable habitat for SGCN and marsh habitats that would benefit from restoration. Conduct research to assess their condition for nesting, migrating and wintering birds.

3.3.1.23 Identify areas (through surveys/studies, predictive modeling, review of available data, enlistment of habitat management and/or species experts, etc.) where the State can allow coastal marsh migration due to sea level rise, and target these areas for land acquisition and/or land management to accommodate this transition. Targeted areas should include underdeveloped areas adjacent to unprotected coastal marshes.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

Job 8.02. Preparing for Wildlife Shifts

Objective: Acquire, protect and/or manage upland and transitional habitats adjacent to coastal marshes to accommodate marsh migration as a result of sea level rise.

Purpose: Create resiliency of coastal marsh habitats in the face of sea level rise.

Benefits: Salt marshes will persist if given space to naturally migrate, allowing them to continue to provide the myriad of benefits they offer to wildlife and society (nesting and foraging habitat, carbon sequestration and storage, flood protection, etc.).

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	Black Rail	Black Skimmer
Common Tern	Forster's Tern	Least Tern
Little Blue Heron	Northern Harrier	Pied-billed Grebe
Red Knot	Ruddy Turnstone	Snowy Egret
Tricolored Heron		

Reptiles & Amphibians

Atlantic Green Turtle	Atlantic Leatherback	Atlantic Loggerhead
Atlantic Ridley	Northern Diamondback Terrapin	

Threats and Action Drivers associated with this conservation need

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture

2.1.1.4 Salt hay farming on Delaware Bay marshes, and the subsequent conversion of those farms to fully tidal marshes, results in compressed sediments that are less resilient to coastal forces of erosion and sea level rise.

7 Natural Systems Modifications

7.3 Other Ecosystem Modifications

7.3.5 Poor habitat management

7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

7.3.5.16 Lack of proactive management to preserve or maintain viable and functioning marshes for SGCN wildlife.

11 Climate Change and Severe Weather

11.5 Sea-level Rise

11.5.0 Sea-level Rise

11.5.0.1 Contributes to the conversion of high salt marsh to low salt marsh, threatening species that depend on high marsh habitat and those dependent on the marsh-upland ecotone.

11.5.0.2 Increased risk of saltwater intrusion into freshwater systems impacting associated wildlife and native vegetation.

11.5.0.3 Alters salinity conditions; increased salinity will alter and degrade aquatic ecosystems, threatening anadromous species by shifting normal breeding areas upstream into potentially unsuitable areas, and causing mortality to salt-intolerant mussels and other species by inundating areas of the lower Delaware River and tributaries.

11.5.0.4 Increased erosion of beach, mudflat and marsh habitats critical for a number of coastal species to fulfill life history requirements.

11.5.0.7 Sea level rise exacerbates marsh loss caused by prior human manipulations (e.g., impoundments, grid-ditching) that reduced the elevation of the marsh.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

2 Direct Management of Natural Resources

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.44 Manage phragmites adjacent to coastal marshes of interest, in particular those that are within underdeveloped areas and are unprotected, through herbicide application and water management to improve resiliency of the marshes to sea level rise.

3 Data Collection and Analysis

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.3 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) remaining high and low marsh habitats with natural buffers and stable water levels that provide suitable habitat for SGCN and marsh habitats that would benefit from restoration. Conduct research to assess their condition for nesting, migrating and wintering birds.

3.3.1.23 Identify areas (through surveys/studies, predictive modeling, review of available data, enlistment of habitat management and/or species experts, etc.) where the State can allow coastal marsh migration due to sea level rise, and target these areas for land acquisition and/or land management to accommodate this transition. Targeted areas should include underdeveloped areas adjacent to unprotected coastal marshes.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.4 Modify best management practices of Open Marsh Water Management based on evaluation of the effectiveness and potential impacts of marsh management techniques on wildlife species, in particular high marsh nesting birds and waterfowl.

3.5.3.17 Investigate and improve marsh management techniques to benefit critical wildlife species, in particular high marsh nesting birds and waterfowl.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.5 Secure and protect critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.5 Promote the protection of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through conservation area designations.

6.4 Private lands agreements

6.4.0 Private land agreement strategies

6.4.0.1 Enter into private lands agreements to expand control burns on private lands, in particular those adjacent to conserved lands to improve SGCN habitats.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

9.3.3 Habitat management planning

9.3.3.25 Develop a habitat management plan focused on areas important to near-shore, coastal species (e.g., herring, sturgeon, terrapin, nesting birds) that prioritizes these areas to direct resources to minimize the impacts of sea-level rise, flooding and storms (including extreme rain events) such as increased erosion of beach, mudflat and marsh habitats, and the increased risk of saltwater intrusion into freshwater habitats. Gather "best information" for spatial modeling of anticipated habitat shifts from sea-level rise, flooding, etc.

Project 9. Marsh Habitats in Trouble

Job 9.01. Today's Marsh Islands in Tomorrow's Higher Seas

Objective: Comprehensively survey all current marsh islands and, along with available historical data, plan for conservation management approaches that may include marsh restoration using thin-layer application, or leaving to become submerged, shallow water habitat.

Purpose: Gather necessary information for planning efforts to manage impacts on marsh island-associated SGCN and their habitats.

Benefits: Habitat improvement and maintenance for coastal marsh wildlife, with secondary benefits to wildlife-related recreation.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	Black Rail	Black Skimmer
Common Tern	Forster's Tern	Least Tern
Little Blue Heron	Northern Harrier	Peregrine Falcon
Red Knot	Ruddy Turnstone	Snowy Egret
Tricolored Heron		

Reptiles & Amphibians

Northern Diamondback Terrapin

Threats and Action Drivers associated with this conservation need

11 Climate Change and Severe Weather

11.5 Sea-level Rise

11.5.0 Sea-level Rise

11.5.0.1 Contributes to the conversion of high salt marsh to low salt marsh, threatening species that depend on high marsh habitat and those dependent on the marsh-upland ecotone.

11.5.0.4 Increased erosion of beach, mudflat and marsh habitats critical for a number of coastal species to fulfill life history requirements.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory

12.1.1.4 Lack of information on the morphometrics and trends of coastal salt marshes and salt marsh islands.

12.1.1.5 Lack of information regarding the SGCN populations that use managed salt marshes and the best techniques for making improvements for marsh-dependent SGCN wildlife.

12.1.2 Lack of up-to-date existing information

12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

3 Data Collection and Analysis

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.21 Conduct comprehensive baseline surveys of all marsh islands; surveys to include, but are not limited to, documented elevations, and assessments of the habitat's current condition and vulnerability of dependent SGCN species in relation to the increased inundation rate.

3.3.2 Monitoring

3.3.2.19 Once baseline data on the marsh islands' and associated SGCN species' vulnerability to inundation is completed, continue to conduct long-term monitoring the islands to determine sustainability for wildlife dependent on these areas.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

9.3.3 Habitat management planning

9.3.3.31 Using data from baseline inventory and monitoring of all current marsh islands and their vulnerability to inundation as a result of sea level rise, create a plan to delineate each island's ideal fit for habitat management (e.g., restoration, hasting, dredging). Planning will factor in criteria to designate which islands should be maintained or restored, and which will be passively allowed to submerge.

Job 9.02. High Marsh Island Creation and Management

Objective: Provide suitable marsh island habitat (i.e., above normal tidal flooding and not connected to the mainland where upland ground predators are a threat) for nesting and loafing marsh species dependent on high marsh areas.

Purpose: Combat coastal flooding and the long term loss of high marsh habitat as a result of sea level rise.

Benefits: Improved nesting occupancy and success by high marsh birds due to maintained habitat, lower flood vunerability and lower predation.

Focal wildlife species benefitting from this job

Birds

Black Rail
Northern Harrier

Reptiles & Amphibians

Northern Diamondback Terrapin

Threats and Action Drivers associated with this conservation need

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture

2.1.1.2 Conversion, and subsequent loss, of high salt marsh to low salt marsh threatens high-marsh dependent species and those dependent on the marsh-upland ecotone.

2.1.2 Small-holder Farming

2.1.2.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.3 Agro-industry

2.1.3.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

7 Natural Systems Modifications

7.3 Other Ecosystem Modifications

7.3.5 Poor habitat management

7.3.5.16 Lack of proactive management to preserve or maintain viable and functioning marshes for SGCN wildlife.

11 Climate Change and Severe Weather

11.4 Storms and Flooding

11.4.1 Storms and flooding

11.4.1.7 Potentially damage coastal habitats, including beach and marsh habitats used by spawning horseshoe crabs, nesting diamondback terrapins, and resting and foraging birds.

11.5 Sea-level Rise

11.5.0 Sea-level Rise

11.5.0.1 Contributes to the conversion of high salt marsh to low salt marsh, threatening species that depend on high marsh habitat and those dependent on the marsh-upland ecotone.

11.5.0.2 Increased risk of saltwater intrusion into freshwater systems impacting associated wildlife and native vegetation.

11.5.0.3 Alters salinity conditions; increased salinity will alter and degrade aquatic ecosystems, threatening anadromous species by shifting normal breeding areas upstream into potentially unsuitable areas, and causing mortality to salt-intolerant mussels and other species by inundating areas of the lower Delaware River and tributaries.

11.5.0.4 Increased erosion of beach, mudflat and marsh habitats critical for a number of coastal species to fulfill life history requirements.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.4 Need to develop new technique

12.1.4.3 Lack of techniques for high marsh preservation that includes impoundments and elevated islands.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform

12.4.0.6 Techniques for ecological management or restoration of shorelines are not fully developed or evaluated for effectiveness for target and non-target SGCN in coastal areas.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

2 Direct Management of Natural Resources

2.1 Create new habitat or natural processes

2.1.1 Habitat conversion

2.1.1.1 Create high marsh habitat through impoundments and diking of low marsh areas that are less susceptible to breaching by storms and sea-level rise.

2.9 Living shorelines

2.9.2 Erosion control structures

2.9.2.1 Install breakwaters in the form of living shorelines to reduce the impact of wave erosion while preserving the natural character of the site.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.9 Minimize habitat loss of critical coastal habitats that provide nesting, migrating, and wintering areas for birds and other coastal species by maintaining or enhancing these areas through vegetation management.

2.11.0.16 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.11.0.22 Minimize habitat loss of high and low marsh habitats that provide nesting, migrating and wintering areas for SGCN birds and other marsh-dependent SGCN by maintaining or enhancing these areas through habitat management and/or revegetation or restoration efforts.

2.12 Water management

2.12.7 Waterfowl impoundment maintenance

2.12.7.11 Restore existing salt hay farm areas by repairing breaches in impoundments to create habitat for high marsh nesting species and waterfowl.

2.12.8 Watering facilities

2.12.8.1 Install water control structures to reduce the impact of excessive salt water flooding to particularly vulnerable high marsh habitats.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.16 Develop a baseline status (through studies and assessments, review of available data, enlistment of species experts, etc.) of marsh- and beach-dependent SGCN (and their habitats) whose populations may be impaired due to habitat degradation as a result of salt hay farm/dike abandonment.

3.0.0.17 Conduct long-term monitoring of marsh- and beach-dependent SGCN (and their habitats) to evaluate the effectiveness of the management strategies implemented to repair degraded marshes and beaches damaged by salt hay farm/dike abandonment within all bay shore areas.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.5 Secure and protect critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.5 Promote the protection of critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through conservation area designations.

6.4 Private lands agreements

6.4.0 Private land agreement strategies

6.4.0.1 Enter into private lands agreements to expand control burns on private lands, in particular those adjacent to conserved lands to improve SGCN habitats.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.17 Evaluate the potential benefits to high marsh species (such as Black Rail and Northern Harrier) by restoring salt hay farms along Delaware Bay.

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

9.3.3 Habitat management planning

9.3.3.33 Evaluate the potential benefits to increasing high marsh habitat by restoring salt hay farms along Delaware Bay.

Job 9.03. Marsh Platform and Edge Protection

Objective: Immediately initiate a stabilization and restoration program that stabilizes the salt marsh platform and edge, and to provides sediment enrichment to a sediment-starved system.

Purpose: Address the loss of salt marsh due to erosion as a result of sea level rise.

Benefits: Protect and improve declining salt marsh habitats.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	Black Rail	Black Skimmer
Common Tern	Forster's Tern	Least Tern
Little Blue Heron	Northern Harrier	Red Knot
Ruddy Turnstone	Snowy Egret	Tricolored Heron

Fish

Alewife	Blueback Herring

Reptiles & Amphibians

Northern Diamondback Terrapin

Threats and Action Drivers associated with this conservation need

11 Climate Change and Severe Weather

11.5 Sea-level Rise

11.5.0 Sea-level Rise

11.5.0.1 Contributes to the conversion of high salt marsh to low salt marsh, threatening species that depend on high marsh habitat and those dependent on the marsh-upland ecotone.

11.5.0.4 Increased erosion of beach, mudflat and marsh habitats critical for a number of coastal species to fulfill life history requirements.

12 Resource Management Needs

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform

12.4.0.6 Techniques for ecological management or restoration of shorelines are not fully developed or evaluated for effectiveness for target and non-target SGCN in coastal areas.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

2 Direct Management of Natural Resources

2.1 Create new habitat or natural processes

2.1.1 Habitat conversion

2.1.1.2 Utilize dredged materials to create marsh islands to provide nesting habitat for birds and marine turtles.

2.9 Living shorelines

2.9.2 Erosion control structures

2.9.2.1 Install breakwaters in the form of living shorelines to reduce the impact of wave erosion while preserving the natural character of the site.

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.46 Implement sediment augmentation techniques on tidal salt marshes to offset marsh subsidence and effects of sea level rise, and to stabilize tidal marsh ecosystem.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

Job 9.04. Restoration of Grid-ditched Marshes

Objective: Increase acreage and function of high marsh habitat in suitable locations by restoring marshes that were historically grid-ditched to change drainage.

Purpose: Counter the effects of historic ditching that changed marsh drainage patterns, and restore high marsh and low marsh function.

Benefits: Increased nesting and foraging habitat for marsh birds; improved nesting success in a natural and functional marsh system.

Focal wildlife species benefitting from this job

Birds

Black Rail
Northern Harrier

Reptiles & Amphibians

Northern Diamondback Terrapin

Threats and Action Drivers associated with this conservation need

7 Natural Systems Modifications

7.3 Other Ecosystem Modifications

7.3.5 Poor habitat management

7.3.5.10 Ditching, draining and filling of marshes and wetlands eliminates habitat and degrades the remaining surrounding areas for wildlife.

11 Climate Change and Severe Weather

11.5 Sea-level Rise

11.5.0 Sea-level Rise

11.5.0.4 Increased erosion of beach, mudflat and marsh habitats critical for a number of coastal species to fulfill life history requirements.

11.5.0.7 Sea level rise exacerbates marsh loss caused by prior human manipulations (e.g., impoundments, grid-ditching) that reduced the elevation of the marsh.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory

12.1.1.5 Lack of information regarding the SGCN populations that use managed salt marshes and the best techniques for making improvements for marsh-dependent SGCN wildlife.

12.1.2 Lack of up-to-date existing information

12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

Conservation actions that address Threats and Action Drivers

2 Direct Management of Natural Resources

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.46 Implement sediment augmentation techniques on tidal salt marshes to offset marsh subsidence and effects of sea level rise, and to stabilize tidal marsh ecosystem.

3 Data Collection and Analysis

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.3 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) remaining high and low marsh habitats with natural buffers and stable water levels that provide suitable habitat for SGCN and marsh habitats that would benefit from restoration. Conduct research to assess their condition for nesting, migrating and wintering birds.

3.3.2 Monitoring

3.3.2.6 Investigate the effectiveness and potential impacts of marsh management techniques by studying the effects of Open Marsh Water Management on wildlife species, in particular high marsh nesting birds and waterfowl. Evaluate best management practices as appropriate.

Job 9.05. The Open Marsh Water Management Tweak

Objective: Refine/revise the current Open Marsh Water Management to develop a marsh restoration plan that meets both mosquito concerns (i.e., the elimination of excessive levels of mosquito breeding) and marsh restoration needs (i.e., restoring proper salt marsh functions) using more recent management data.

Purpose: Provide suitable salt marsh habitat for wildlife while benefitting NJ residents and visitors.

Benefits: Improved salt marsh function reduces or eliminates the need for chemical control of mosquitoes, and builds trust with mosquito control agencies and the conservation community.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	Black Rail	Black Skimmer
Common Tern	Forster's Tern	Least Tern
Little Blue Heron	Northern Harrier	Piping Plover
Red Knot	Ruddy Turnstone	Snowy Egret
Tricolored Heron		

Reptiles & Amphibians

Northern Diamondback Terrapin

Threats and Action Drivers associated with this conservation need

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory

12.1.1.5 Lack of information regarding the SGCN populations that use managed salt marshes and the best techniques for making improvements for marsh-dependent SGCN wildlife.

12.1.2 Lack of up-to-date existing information

12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.4 Need to develop new technique

12.1.4.4 Lack of consideration of habitat management opportunities in the course of salt marsh management for mosquito control.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.16 Develop a baseline status (through studies and assessments, review of available data, enlistment of species experts, etc.) of marsh- and beach-dependent SGCN (and their habitats) whose populations may be impaired due to habitat degradation as a result of salt hay farm/dike abandonment.

3.0.0.17 Conduct long-term monitoring of marsh- and beach-dependent SGCN (and their habitats) to evaluate the effectiveness of the management strategies implemented to repair degraded marshes and beaches damaged by salt hay farm/dike abandonment within all bay shore areas.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.20 Evaluate the effectiveness of BMPs for mosquito control methods that may produce benefits for coastal marsh dependent SGCN wildlife, including but not limited to high-marsh nesting birds and migrating shorebirds and landbirds.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.3 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) remaining high and low marsh habitats with natural buffers and stable water levels that provide suitable habitat for SGCN and marsh habitats that would benefit from restoration. Conduct research to assess their condition for nesting, migrating and wintering birds.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.4 Modify best management practices of Open Marsh Water Management based on evaluation of the effectiveness and potential impacts of marsh management techniques on wildlife species, in particular high marsh nesting birds and waterfowl.

3.5.3.17 Investigate and improve marsh management techniques to benefit critical wildlife species, in particular high marsh nesting birds and waterfowl.

3.5.3.18 Develop recommendations to improve methods on land use practices such as ditching, impounding, dredging, open marsh water management, burning, and marsh restoration based on potential impacts on marsh-dependent SGCN.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.3 Investigate alternative saltmarsh mosquito control methods that may produce benefits for coastal marsh dependent SGCN wildlife, including but not limited to high-marsh nesting birds and migrating shorebirds and landbirds.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

Job 9.06. Impoundment Restoration Management

Objective: To improve habitat availability for focal bird species and their resiliency to the impacts of sea level rise by managing water levels in impoundments.

Purpose: To reduce the risk of habitat loss for shorebirds, wading birds, and other waterbirds as a result of and/or during storms and sea level rise.

Benefits: Habitat improvement, increased habitat predictability and availability.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	Black Rail	Black Skimmer
Common Tern	Forster's Tern	Least Tern
Little Blue Heron	Northern Harrier	Red Knot
Ruddy Turnstone	Snowy Egret	Tricolored Heron

Threats and Action Drivers associated with this conservation need

11 Climate Change and Severe Weather

11.5 Sea-level Rise

11.5.0 Sea-level Rise

11.5.0.1 Contributes to the conversion of high salt marsh to low salt marsh, threatening species that depend on high marsh habitat and those dependent on the marsh-upland ecotone.

11.5.0.4 Increased erosion of beach, mudflat and marsh habitats critical for a number of coastal species to fulfill life history requirements.

Conservation actions that address Threats and Action Drivers

2 Direct Management of Natural Resources

2.12 Water management

2.12.8 Watering facilities

2.12.8.2 Manage water levels in impoundments to improve coastal marsh habitat availability to wildlife and improve resiliency of the marshes to sea level rise.

Project 10. Best Management Practices (BMPs) to Benefit SGCN and their Habitats

Job 10.01. Focal Species and Species Guilds

Objective: Increase the statewide use of BMPs for focal SGCN by developing and providing easy reference guidance materials for landowners and existing and potential land managers, in particular forest managers.

Purpose: Improve SGCN habitats statewide, in particular for forest-associated species.

Benefits: Creation and enhancement of habitats for SGCN focal species can increase survivorship and fecundity of these species and help stabilize or reverse population declines.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	American Woodcock	Black Rail
Black Skimmer	Blue-winged Warbler	Bobolink
Cerulean Warbler	Common Tern	Eastern Meadowlark
Forster's Tern	Golden-winged Warbler	Grasshopper Sparrow
Kentucky Warbler	Least Tern	Little Blue Heron
Northern Bobwhite	Northern Harrier	Peregrine Falcon
Pied-billed Grebe	Piping Plover	Prothonotary Warbler
Red Knot	Red-headed Woodpecker	Ruddy Turnstone
Scarlet Tanager	Snowy Egret	Tricolored Heron
Vesper Sparrow	Wood Thrush	

Fish

Alewife	Banded Sunfish	Blackbanded Sunfish
Blueback Herring	Bridle Shiner	Brook Trout
Comely Shiner	Ironcolor Shiner	Mud Sunfish
Swamp Darter		

Macroinvertebrates

A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper
Ashton Cuckoo Bumble Bee	Brook Floater	Buchholz's Dart Moth
Buchholz's Gray	Carter's Noctuid Moth	Daecke's Pyralid Moth

Dotted Skipper	Dwarf Wedgemussel	Eastern Lampmussel
Frosted Elfin	Georgia Satyr	Green Floater
Hoary Elfin	Leonard's Skipper	Little White Tiger Beetle
Maritime Sunflower Borer Moth	New England Bluet	New Jersey Pine Barrens Tiger Beetle
Northeastern Beach Tiger Beetle	Northern Metalmark	Papaipema harrisii
Pine Barrens Bluet	Pink Sallow	Robust Baskettail
Rusty Patched Bumble Bee	Sand Myrtle Looper/Pink	Scarlet Bluet
Septima's Clubtail	Southeastern Beach Tiger Beetle	Southern Plains Bumble Bee
Superb Jewelwing	Triangle Floater	Variable Cuckoo Bumble Bee
Yellow Bumble Bee	Yellow Lampmussel	Yellow-banded Bumble Bee
Mammals		
Allegheny Woodrat	Indiana Bat	Little Brown Bat
Northern Myotis		
Reptiles & Amphibians		
Bog Turtle	Carpenter Frog	Corn Snake
Eastern Box Turtle	Eastern Hognose Snake	Eastern Redbelly Turtle
Eastern Spadefoot	Eastern Tiger Salamander	Longtail Salamander
New Jersey Chorus Frog	Northern Black Racer	Northern Diamondback Terrapin
Northern Pine Snake	Northern Red Salamander	Northern Scarlet Snake
Pine Barrens Treefrog	Timber Rattlesnake	Wood Turtle

Threats and Action Drivers associated with this conservation need

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

2 Direct Management of Natural Resources

2.13 Wildlife damage management

2.13.0 Nuisance fish and wildlife damage

2.13.0.1 Investigate the impacts of mosquito control methods on predator SGCN (bats, insectivorous birds). Develop, implement and evaluate the effectiveness of mosquito control-BMPs designed to avoid depletion or contamination of SGCN's insect prey base and drinking sources with pyrethroids, organophosphates, or other chemicals.

2.13.0.2 Develop, implement and evaluate the effectiveness of BMPs for mosquito control methods that may produce benefits for coastal marsh dependent SGCN wildlife, including but not limited to high-marsh nesting birds and migrating shorebirds and landbirds.

3 Data Collection and Analysis

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.24 Develop, implement and evaluate the effectiveness of BMPs for lighting of/on tall structures that minimize harm to and/or disorient wildlife, in particular but not limited to migratory birds, bats and invertebrates. Implement BMPs into state, county and local permitting processes.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.8 Develop best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.10 Develop BMPs for lighting of/on tall structures that minimize harm to and/or disorientation of wildlife, in particular but not limited to migratory birds, bats and invertebrates.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

9.3.3 Habitat management planning

9.3.3.6 Develop a management plan for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

Job 10.02. Forest Health

Objective: Improve forest sustainability and resilience to invasive and abundant pests by developing BMPs that promote managing for age structure and composition, and making this information available to public and private landowners for implementation.

Purpose: Manage more lands for healthy forests to benefit forest species and improve their chances to persist.

Benefits: Healthy forest that can transition with changing conditions and insects.

Focal wildlife species benefitting from this job

Birds

American Woodcock	Blue-winged Warbler	Cerulean Warbler
Golden-winged Warbler	Kentucky Warbler	Northern Bobwhite
Prothonotary Warbler	Red-headed Woodpecker	Scarlet Tanager
Wood Thrush		

Macroinvertebrates

A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper
Ashton Cuckoo Bumble Bee	Buchholz's Dart Moth	Buchholz's Gray
Carter's Noctuid Moth	Daecke's Pyralid Moth	Dotted Skipper
Frosted Elfin	Georgia Satyr	Hoary Elfin
Leonard's Skipper	Maritime Sunflower Borer Moth	New England Bluet
New Jersey Pine Barrens Tiger Beetle	Northern Metalmark	Papaipema harrisii
Pine Barrens Bluet	Pink Sallow	Robust Baskettail

Rusty Patched Bumble Bee	Sand Myrtle Looper/Pink	Scarlet Bluet
Septima's Clubtail	Southern Plains Bumble Bee	Superb Jewelwing
Variable Cuckoo Bumble Bee	Yellow Bumble Bee	Yellow-banded Bumble Bee
Mammals		
Allegheny Woodrat	Indiana Bat	Little Brown Bat
Northern Myotis		
Reptiles & Amphibians		
Carpenter Frog	Corn Snake	Eastern Box Turtle
Eastern Hognose Snake	Eastern Spadefoot	Eastern Tiger Salamander
Longtail Salamander	New Jersey Chorus Frog	Northern Black Racer
Northern Pine Snake	Northern Red Salamander	Northern Scarlet Snake
Pine Barrens Treefrog	Timber Rattlesnake	Wood Turtle

Threats and Action Drivers associated with this conservation need

5 Biological Resource Use

5.3 Logging and Wood Harvesting

5.3.1 Intentional Use (subsistence/small scale)

5.3.1.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.1.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.1.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.1.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.1.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.1.6 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices in Atlantic White Cedar stands may destroy a unique wildlife wetland habitat that is difficult, and takes time, to restore.

5.3.2 Intentional Use (large scale)

5.3.2.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.2.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.2.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.2.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.2.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.2.6 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices in Atlantic White Cedar stands may destroy a unique wildlife wetland habitat that is difficult, and takes time, to restore.

5.3.3 Unintentional effects (subsistence/small scale)

5.3.3.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.3.2 Poorly planned/implemented tree harvesting adjacent to waterways and vernal pools can lead to increased water temperatures, soil erosion and sedimentation, and reduces the potential for woody debris within the aquatic system, leading to negative impacts on wildlife.

5.3.4 Unintentional effects (large scale)

5.3.4.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.4.2 Extensive infrastructure and larger equipment requirements present a potential risk of direct injury/mortality to wildlife.

5.3.4.3 Poorly planned/implemented tree harvesting adjacent to waterways and vernal pools can lead to increased water temperatures, soil erosion and sedimentation, and reduces the potential for woody debris within the aquatic system, leading to negative impacts on wildlife.

5.3.4.4 Infrastructure and/or equipment use may result in subtle changes to drainage patterns, adversely affecting vernal pool and wetland hydrology.

5.3.4.5 Lack of appropriate, sustainable forest management can lead to a decrease in forest habitat diversity, degraded habitat for many forest species, the loss of habitat for early-successional species, and/or the loss of unique habitats for species that need canopy breaks and multi-aged tree composition to fulfill various life history requirements.

7 Natural Systems Modifications

7.3 Other Ecosystem Modifications

7.3.5 Poor habitat management

7.3.5.5 Habitat management that alters or removes vegetation without implementing long-term management increases the risk of invasive and exotic plants establishing themselves, outcompeting native vegetation.

7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

2 Direct Management of Natural Resources

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.43 Manage forests to increase variation in age structure and composition using BMPs that promote and maintain functioning ecological forest-based systems and biological diversity.

3 Data Collection and Analysis

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.8 Develop best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

9.3.3 Habitat management planning

9.3.3.6 Develop a management plan for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

Job 10.03. Scrub-shrub and Young Forest Habitat Management

Objective: Develop and/or revise species-specific best management practices (BMPs) to create site-appropriate BMPs (i.e., for use in specific areas such as rights-of-way, agricultural lands, forested lands, etc.) for scrub-shrub and young forest habitats and make them available to public and private land managers for implementation.

Purpose: Manage more lands using site-appropriate scrub-shrub and young forest BMPs to benefit these species and improve their chances to persist.

Benefits: Creation and enhancement of scrub-shrub and young forest habitats can increase survivorship and fecundity of SGCN and help stabilize or reverse population declines.

Focal wildlife species benefitting from this job

Birds

American Woodcock	Blue-winged Warbler	Bobolink
Cerulean Warbler	Eastern Meadowlark	Golden-winged Warbler
Grasshopper Sparrow	Kentucky Warbler	Northern Bobwhite
Prothonotary Warbler	Red-headed Woodpecker	Scarlet Tanager
Vesper Sparrow	Wood Thrush	

Fish

Banded Sunfish	Blackbanded Sunfish	Bridle Shiner
Brook Trout	Comely Shiner	Ironcolor Shiner
Mud Sunfish	Swamp Darter	

Macroinvertebrates

A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper
Ashton Cuckoo Bumble Bee	Buchholz's Dart Moth	Buchholz's Gray
Carter's Noctuid Moth	Daecke's Pyralid Moth	Dotted Skipper
Frosted Elfin	Georgia Satyr	Hoary Elfin
Leonard's Skipper	Maritime Sunflower Borer Moth	New England Bluet
New Jersey Pine Barrens Tiger Beetle	Northern Metalmark	Papaipema harrisii
Pine Barrens Bluet	Pink Sallow	Robust Baskettail
Rusty Patched Bumble Bee	Sand Myrtle Looper/Pink	Scarlet Bluet
Septima's Clubtail	Southern Plains Bumble Bee	Superb Jewelwing
Variable Cuckoo Bumble Bee	Yellow Bumble Bee	Yellow-banded Bumble Bee

Mammals

Indiana Bat	Little Brown Bat	Northern Myotis

Reptiles & Amphibians

Carpenter Frog	Corn Snake	Eastern Box Turtle
Eastern Hognose Snake	Eastern Spadefoot	Eastern Tiger Salamander
Longtail Salamander	New Jersey Chorus Frog	Northern Black Racer
Northern Pine Snake	Northern Red Salamander	Northern Scarlet Snake
Pine Barrens Treefrog	Timber Rattlesnake	Wood Turtle

Threats and Action Drivers associated with this conservation need

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture

2.1.1.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.2 Small-holder Farming

2.1.2.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.2.2 Fragments terrestrial and aquatic habitats.

2.1.2.3 Agricultural practices (e.g., mechanized, row-crop agriculture) can render lands unsuitable for most wildlife due to soil degradation and erosion and can cause direct mortality to wildlife when harvesting takes places.

2.1.3 Agro-industry

2.1.3.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.3.2 Fragments terrestrial and aquatic habitats.

2.1.3.3 Agricultural practices (e.g., mechanized, row-crop agriculture) can render lands unsuitable for most wildlife due to soil degradation and erosion and can cause direct mortality to wildlife when harvesting takes places.

2.2 Wood and Pulp Plantations

2.2.1 Small Holder

2.2.1.3 Improper design or restoration of skid roads may result in ponded areas that serve as habitat sinks for amphibians.

2.2.2 Agro-industry Plantations

2.2.2.3 Improper design or restoration of skid roads may result in ponded areas that serve as habitat sinks for amphibians.

4 Transportation and Service Corridors

4.2 Utility and Service Lines

4.2.2 Management of rights-of-way or communication tower facilities and/or their associated access roads

4.2.2.1 Improper or poorly scheduled vegetation management can cause direct mortality to and may reduce productivity of wildlife.

7 Natural Systems Modifications

7.3 Other Ecosystem Modifications

7.3.5 Poor habitat management

7.3.5.1 Improper or poorly scheduled maintenance of man-made corridors (e.g., roadsides and medians) can cause direct mortality to and may reduce productivity of wildlife.

7.3.5.4 Vegetation clearing or inappropriate alteration adjacent to aquatic habitats threatens aquatic species by degrading habitat and water quality (altering temperature and dissolved oxygen, increasing siltation and dessication, etc.).

7.3.5.5 Habitat management that alters or removes vegetation without implementing long-term management increases the risk of invasive and exotic plants establishing themselves, outcompeting native vegetation.

7.3.5.6 Habitat management, including that which occurs on public and private lands, that does not consider timing and species' behaviors can result in the direct mortality and/or alteration or loss of habitat.

7.3.5.12 Lack of diversity in age structure and composition of vegetation due to lack of natural disturbances and/or vegetation management.

7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

2 Direct Management of Natural Resources

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.13 Implement best management practices (BMPs), protective strategies, and guidelines for vegetation management to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.11.0.20 Create and/or maintain scrub-shrub habitats through management efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.11.0.24 Conduct vegetation management adjacent to aquatic habitats following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.25 Conduct vegetation management along access roads following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.27 Conduct vegetation management for target shrub- or young forest-dependent SGCN following BMPs to minimize the risk of the establishment of invasive and non-native plants.

2.11.0.28 Conduct vegetation management in agricultural areas following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.29 Conduct vegetation management on transportation and service corridors (i.e., rights-of-way) following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

3 Data Collection and Analysis

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.7 Develop/improve forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

9.3.3 Habitat management planning

9.3.3.6 Develop a management plan for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

11 Technical Assistance

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

Job 10.04. Cooperative Partnerships with Corporations and Transportation Authorities to Implement Appropriate Habitat Management Strategies

Objective: Encourage and support corporations and transportation authorities to conduct habitat creation and enhancement, and integrate appropriate timing of BMPs in upland habitats by developing outreach programs/materials and providing technical assistance.

Purpose: Minimize impacts on SGCN by managing lands using SGCN-focused habitat management strategies and implementing appropriate BMPs for all activities.

Benefits: Creation and enhancement of habitats for SGCN can increase survivorship and fecundity of these species and help stabilize or reverse population declines.

Focal wildlife species benefitting from this job

Birds

American Woodcock	Blue-winged Warbler	Bobolink
Cerulean Warbler	Eastern Meadowlark	Golden-winged Warbler
Grasshopper Sparrow	Kentucky Warbler	Little Blue Heron
Northern Bobwhite	Northern Harrier	Peregrine Falcon
Prothonotary Warbler	Red Knot	Red-headed Woodpecker
Ruddy Turnstone	Scarlet Tanager	Snowy Egret
Tricolored Heron	Vesper Sparrow	Wood Thrush

Fish

Banded Sunfish	Blackbanded Sunfish	Bridle Shiner
Brook Trout	Comely Shiner	Ironcolor Shiner
Mud Sunfish	Swamp Darter	

Macroinvertebrates

A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper
Ashton Cuckoo Bumble Bee	Brook Floater	Buchholz's Dart Moth
Buchholz's Gray	Carter's Noctuid Moth	Daecke's Pyralid Moth
Dotted Skipper	Dwarf Wedgemussel	Eastern Lampmussel
Frosted Elfin	Georgia Satyr	Green Floater
Hoary Elfin	Leonard's Skipper	Little White Tiger Beetle
Maritime Sunflower Borer Moth	New England Bluet	New Jersey Pine Barrens Tiger Beetle

Northeastern Beach Tiger Beetle	Northern Metalmark	Papaipema harrisii
Pine Barrens Bluet	Pink Sallow	Robust Baskettail
Rusty Patched Bumble Bee	Sand Myrtle Looper/Pink	Scarlet Bluet
Septima's Clubtail	Southeastern Beach Tiger Beetle	Southern Plains Bumble Bee
Superb Jewelwing	Triangle Floater	Variable Cuckoo Bumble Bee
Yellow Bumble Bee	Yellow Lampmussel	Yellow-banded Bumble Bee

Mammals

Allegheny Woodrat	Indiana Bat	Little Brown Bat
Northern Myotis		

Reptiles & Amphibians

Bog Turtle	Carpenter Frog	Corn Snake
Eastern Box Turtle	Eastern Hognose Snake	Eastern Redbelly Turtle
Eastern Spadefoot	Eastern Tiger Salamander	Longtail Salamander
New Jersey Chorus Frog	Northern Black Racer	Northern Diamondback Terrapin
Northern Pine Snake	Northern Red Salamander	Northern Scarlet Snake
Pine Barrens Treefrog	Timber Rattlesnake	Wood Turtle

Threats and Action Drivers associated with this conservation need

3 Energy Production and Mining

- 3.1 Oil and Gas Facilities and Pipelines
  - 3.1.1 Distribution processes of petroleum and other liquid hydrocarbons
    - 3.1.1.1 Fragments terrestrial and aquatic habitats.
    - 3.1.1.2 Loss, alteration and/or degradation of habitat.
  - 3.1.2 Natural gas distribution processes
    - 3.1.2.1 Fragments terrestrial and aquatic habitats.
    - 3.1.2.2 Loss, alteration and/or degradation of habitat.
- 3.2 Mining and Quarrying
  - 3.2.2 Surface Mining - Rock Quarry (and sand quarries)
    - 3.2.2.1 Fragments terrestrial and aquatic habitats.
    - 3.2.2.2 Loss, alteration and/or degradation of habitat.
- 3.3 Renewable Energy

3.3.1 Wind Power

3.3.1.2 Fragments terrestrial habitats.

3.3.1.3 Loss, alteration and/or degradation of habitat.

3.3.1.4 Increased commercial infrastructure.

3.3.2 Solar Power

3.3.2.1 Fragments terrestrial habitats.

3.3.2.2 Loss, alteration and/or degradation of habitat.

3.3.2.3 Increased commercial infrastructure.

3.4 Conventional Power Plants

3.4.0 Conventional Power Plants

3.4.0.2 Loss, alteration and/or degradation of habitat due to new or the expansion of current facilities.

3.4.0.3 Alteration of the temperature, pH and/or hydrology of aquatic ecosystems change plant communities and can harm wildlife and/or impact their behavior and survivorship.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale)

4.1.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species and inhibiting dispersal of non-volant animals, reducing gene flow.

4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads

4.2.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species, inhibiting dispersal of non-volant animals, reducing gene flow, and creating barriers to fish when service line-associated roads cross streams (e.g., bridges, culverts, fords, etc).

4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

4.2.2 Management of rights-of-way or communication tower facilities and/or their associated access roads

4.2.2.1 Improper or poorly scheduled vegetation management can cause direct mortality to and may reduce productivity of wildlife.

4.4 Flight Paths

4.4.1 Airplane flight paths

4.4.1.1 Increased noise disturbance to wildlife, disrupting their normal behaviors.

4.4.1.2 Increased risk of collision between airplanes and birds, bats and insects.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.45 Form cooperative partnerships with airports and airline companies to facilitate habitat creation away from airports and outside of flight patterns, and to identify seasonal wildlife strike risks to determine if seasonal shifts in flight patterns will minimize this risk.

8.1.0.47 Form cooperative partnerships with energy companies to facilitate habitat creation and enhancement away from and outside of project areas, the restoration of appropriate habitats within project areas (e.g., rights-of-way could benefit butterflies and some bird species), and to identify seasonal timing of activities that would minimize impacts to wildlife.

8.1.0.48 Form cooperative partnerships with transportation and shipment agencies and companies to facilitate habitat creation and enhancement away from and outside of project areas and to identify seasonal timing of activities that would minimize impacts to wildlife.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

11 Technical Assistance

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.6 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on habitat creation, enhancement and restoration within and adjacent to project areas, as well as away from and outside of project areas (depending on the target species), by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. Wind farms should address both terrestrial bound and low-flying species. Examples of habitat management include, but are not limited to, integrating short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow setasides.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.4 Provide educational resources, training programs, and on-the-ground guidance to dredging companies and resource managers on habitat creation and enhancement away from and outside of shipping lanes, and to identify seasonal timing of activities that would minimize impacts to wildlife and their habitats.

Job 10.05. Management of a Former Solar Farm Footprint

Objective: Implement habitat management BMPs on surfaces previously associated with solar farms that had been created within forested areas to provide: (A) Potential breeding habitats for forest-associated/-dependent wildlife species, in particular reptiles and amphibians, and (B) Foraging habitat (e.g., invertebrate host plants, pollinator plants, natural material debris piles).

Purpose: Enhance forest edges necessary for forest-associated and -dependent species with open-canopy needs.

Benefits: Enhancement of forest edge habitats can reduce fragmentation of forests, increase survivorship and fecundity of SGCN, and help stabilize or reverse population declines.

Focal wildlife species benefitting from this job

Birds

American Woodcock	Blue-winged Warbler	Cerulean Warbler
Golden-winged Warbler	Kentucky Warbler	Northern Bobwhite

Prothonotary Warbler	Red-headed Woodpecker	Scarlet Tanager
Wood Thrush		

Macroinvertebrates

A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper
Ashton Cuckoo Bumble Bee	Buchholz's Dart Moth	Buchholz's Gray
Carter's Noctuid Moth	Daecke's Pyralid Moth	Dotted Skipper
Frosted Elfin	Georgia Satyr	Hoary Elfin
Leonard's Skipper	Maritime Sunflower Borer Moth	New England Bluet
New Jersey Pine Barrens Tiger Beetle	Northern Metalmark	Papaipema harrisii
Pine Barrens Bluet	Pink Sallow	Robust Baskettail
Rusty Patched Bumble Bee	Sand Myrtle Looper/Pink	Scarlet Bluet
Septima's Clubtail	Southern Plains Bumble Bee	Superb Jewelwing
Variable Cuckoo Bumble Bee	Yellow Bumble Bee	Yellow-banded Bumble Bee

Reptiles & Amphibians

Carpenter Frog	Corn Snake	Eastern Box Turtle
Eastern Hognose Snake	Eastern Spadefoot	Longtail Salamander
New Jersey Chorus Frog	Northern Black Racer	Northern Pine Snake
Northern Red Salamander	Northern Scarlet Snake	Pine Barrens Treefrog
Timber Rattlesnake	Wood Turtle	

Threats and Action Drivers associated with this conservation need

3 Energy Production and Mining

3.3 Renewable Energy

3.3.2 Solar Power

3.3.2.1 Fragments terrestrial habitats.

3.3.2.2 Loss, alteration and/or degradation of habitat.

3.3.2.3 Increased commercial infrastructure.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

9.3.3 Habitat management planning

9.3.3.6 Develop a management plan for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

100 Law and Policy

100.4 State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

Project 11. Habitat Management to Improve Ecological Diversity

Job 11.01. Managing Microhabitats for Focal Species

Objective: Incorporate structural habitat diversity and appropriate management strategies and timing to benefit the widest range of species on parcels or within habitat patches. For example, provide areas of short and tall growing grasses for ground-nesting birds, native wildflowers/host plants and brush piles for invertebrates, water sources/wetlands for amphibians, stream buffers for wood turtles, scrub-shrub component, nesting areas, and no-mow setasides, etc.

Purpose: Improve wildlife diversity by creating a structurally diverse habitat.

Benefits: Improve nesting success for ground-nesting birds and the presence/persistence of host and food source plants for invertebrates. Such management will provide a synergistic and efficient use of available land and resources that will benefit a wide suite of focal species on available lands. Enhancement of habitats for SGCN focal species can increase survivorship and fecundity of these species and many others, and help stabilize or reverse population declines.

Focal wildlife species benefitting from this job

Birds

American Woodcock	Blue-winged Warbler	Bobolink
Cerulean Warbler	Eastern Meadowlark	Golden-winged Warbler
Grasshopper Sparrow	Kentucky Warbler	Northern Bobwhite
Prothonotary Warbler	Red-headed Woodpecker	Scarlet Tanager
Vesper Sparrow	Wood Thrush	

Fish

Banded Sunfish	Blackbanded Sunfish	Bridle Shiner
Brook Trout	Comely Shiner	Ironcolor Shiner
Mud Sunfish	Swamp Darter	

Macroinvertebrates

A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper
Ashton Cuckoo Bumble Bee	Brook Floater	Buchholz's Dart Moth
Buchholz's Gray	Carter's Noctuid Moth	Daecke's Pyralid Moth
Dotted Skipper	Dwarf Wedgemussel	Eastern Lampmussel
Frosted Elfin	Georgia Satyr	Green Floater
Hoary Elfin	Leonard's Skipper	Maritime Sunflower Borer Moth

New England Bluet	New Jersey Pine Barrens Tiger Beetle	Northern Metalmark
Papaipema harrisii	Pine Barrens Bluet	Pink Sallow
Robust Baskettail	Rusty Patched Bumble Bee	Sand Myrtle Looper/Pink
Scarlet Bluet	Septima's Clubtail	Southern Plains Bumble Bee
Superb Jewelwing	Triangle Floater	Variable Cuckoo Bumble Bee
Yellow Bumble Bee	Yellow Lampmussel	Yellow-banded Bumble Bee

Reptiles & Amphibians

Bog Turtle	Carpenter Frog	Corn Snake
Eastern Box Turtle	Eastern Hognose Snake	Eastern Redbelly Turtle
Eastern Spadefoot	Eastern Tiger Salamander	Longtail Salamander
New Jersey Chorus Frog	Northern Black Racer	Northern Diamondback Terrapin
Northern Pine Snake	Northern Red Salamander	Northern Scarlet Snake
Pine Barrens Treefrog	Timber Rattlesnake	Wood Turtle

Threats and Action Drivers associated with this conservation need

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale)

1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.1.1.2 Loss, alteration and/or degradation of habitat.

1.1.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.

1.1.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.

1.1.1.5 Impervious surfaces can lead to a decrease in water recharge.

1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.1.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale)

1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.2.1.2 Loss, alteration and/or degradation of habitat.

1.2.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.

1.2.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.

1.2.1.5 Impervious surfaces can lead to a decrease in water recharge.

1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.2.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale)

1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.3.1.2 Loss, alteration and/or degradation of habitat.

1.3.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.

1.3.1.4 Impervious surfaces can lead to a decrease in water recharge.

1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.3.1.6 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture

2.1.1.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.2 Small-holder Farming

2.1.2.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.2.2 Fragments terrestrial and aquatic habitats.

2.1.2.3 Agricultural practices (e.g., mechanized, row-crop agriculture) can render lands unsuitable for most wildlife due to soil degradation and erosion and can cause direct mortality to wildlife when harvesting takes places.

2.1.3 Agro-industry

2.1.3.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.3.2 Fragments terrestrial and aquatic habitats.

2.1.3.3 Agricultural practices (e.g., mechanized, row-crop agriculture) can render lands unsuitable for most wildlife due to soil degradation and erosion and can cause direct mortality to wildlife when harvesting takes places.

2.2 Wood and Pulp Plantations

2.2.1 Small Holder

2.2.1.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.2.1.3 Improper design or restoration of skid roads may result in ponded areas that serve as habitat sinks for amphibians.

2.2.2 Agro-industry Plantations

2.2.2.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.2.2.3 Improper design or restoration of skid roads may result in ponded areas that serve as habitat sinks for amphibians.

2.3 Livestock Farming and Ranching

2.3.2 Small-holder Grazing

2.3.2.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.2.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

2.3.3 Agro-industry Grazing

2.3.3.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.3.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

2.3.3.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.3.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

3 Energy Production and Mining

3.1 Oil and Gas Facilities and Pipelines

3.1.1 Distribution processes of petroleum and other liquid hydrocarbons

3.1.1.1 Fragments terrestrial and aquatic habitats.

3.1.1.2 Loss, alteration and/or degradation of habitat.

3.1.2 Natural gas distribution processes

3.1.2.1 Fragments terrestrial and aquatic habitats.

3.1.2.2 Loss, alteration and/or degradation of habitat.

3.2 Mining and Quarrying

3.2.2 Surface Mining - Rock Quarry (and sand quarries)

3.2.2.1 Fragments terrestrial and aquatic habitats.

3.2.2.2 Loss, alteration and/or degradation of habitat.

3.3 Renewable Energy

3.3.1 Wind Power

3.3.1.2 Fragments terrestrial habitats.

3.3.1.3 Loss, alteration and/or degradation of habitat.

3.3.1.4 Increased commercial infrastructure.

3.3.2 Solar Power

3.3.2.1 Fragments terrestrial habitats.

3.3.2.2 Loss, alteration and/or degradation of habitat.

3.3.2.3 Increased commercial infrastructure.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale)

4.1.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species and inhibiting dispersal of non-volant animals, reducing gene flow.

4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.1.1.3 Re-establishment of abandoned railroad lines may displace wildlife, in particular, less mobile species using the area to fulfill critical life history requirements.

4.1.1.5 Re-establishment of abandoned railroad lines may decrease turtles' abilities to disperse due to their difficulty traversing the railroad ties and tracks, leading to decreased genetic exchange.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads

4.2.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species, inhibiting dispersal of non-volant animals, reducing gene flow, and creating barriers to fish when service line-associated roads cross streams (e.g., bridges, culverts, fords, etc).

4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

4.2.2 Management of rights-of-way or communication tower facilities and/or their associated access roads

4.2.2.1 Improper or poorly scheduled vegetation management can cause direct mortality to and may reduce productivity of wildlife.

7 Natural Systems Modifications

7.1 Fire and Fire Suppression

7.1.1 Increase in Fire Frequency/Intensity

7.1.1.4 Lack of diversity in age structure and composition of vegetation due to expansive, frequent fires.

7.1.2 Suppression of Fire Frequency/Intensity

7.1.2.2 Lack of diversity in age structure and composition of vegetation due to the suppression of fire.

7.3 Other Ecosystem Modifications

7.3.2 Inappropriate timing of mowing

7.3.2.1 Increased risk of direct mortality and/or reduced productivity of wildlife, as well as reduced use by migrating species.

7.3.3 Removal of coarse woody debris (streams, forests, scrub-shrub habitats)

7.3.3.1 Decreases the available detritus that normally accumulates behind and within stream obstructions, minimizing or eliminating food sources and shelters for fishes, invertebrates and amphibians.

7.3.3.2 Decreases habitat and/or corridor suitability due to limited or absent shelter and foraging habitat.

7.3.3.4 Decreases available basking, shelter, and foraging habitats.

7.3.4 Lack of natural disturbance patterns or ecosystem functions due to species loss

7.3.4.5 The lack of forest disturbance minimizes the diversity of herbaceous vegetation and other shrubs and trees that need a lot of sunlight to grow.

7.3.5 Poor habitat management

7.3.5.1 Improper or poorly scheduled maintenance of man-made corridors (e.g., roadsides and medians) can cause direct mortality to and may reduce productivity of wildlife.

7.3.5.2 Shifting from natural vegetation to lawns can cause increased temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

7.3.5.3 Vegetation clearing removes terrestrial and riparian corridors for animal movement, shelter, and resting areas.

7.3.5.4 Vegetation clearing or inappropriate alteration adjacent to aquatic habitats threatens aquatic species by degrading habitat and water quality (altering temperature and dissolved oxygen, increasing siltation and dessication, etc.).

7.3.5.5 Habitat management that alters or removes vegetation without implementing long-term management increases the risk of invasive and exotic plants establishing themselves, outcompeting native vegetation.

7.3.5.6 Habitat management, including that which occurs on public and private lands, that does not consider timing and species' behaviors can result in the direct mortality and/or alteration or loss of habitat.

7.3.5.7 Improperly planned habitat management and/or mitigation efforts along roadsides and within the medians can attract wildlife and increase the risk of vehicle strikes.

7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

7.3.5.17 Decreased diversity in height and species of herbaceous vegetation resulting in reduced cover and food for nesting and foraging wildlife.

7.3.5.18 Lack of funding or competitive market prices to maintain native grasslands for grassland-dependent species causes conversion of fallow or hay fields to other crops or shrublands.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species

8.1.1.1 Displace or outcompete native species for resources.

8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.

8.1.1.4 Invasive, non-native animals increase the risk of predation on native animals and/or herbivory on native vegetation.

8.1.1.5 Invasive, non-native animals and plants increase the risk of introduction and transference of diseases.

8.1.1.6 Invasive, non-native plants may create physical barriers for some species.

8.1.3 Invasive non-native aquatic plants

8.1.3.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.5 Invasive non-native terrestrial/wetland plants

8.1.5.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.2 Problematic Native Species/Diseases

8.2.1 Unspecified Species

8.2.1.3 Invasive, native species can out-compete non-invasive species for resources (food, light, shelter), leading to the demise of some species populations.

12 Resource Management Needs

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.18 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and land managers to control and reduce the impacts of invasive, native and non-native species in order to increase structural habitat diversity.

1.2.1.22 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to horse/livestock farm owners and managers to increase structural habitat diversity in and around the farms by managing vegetation for a variety of species, in particular, farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

1.2.1.28 Create incentives to implement dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

2 Direct Management of Natural Resources

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.6 Implement long-term management of invasive and/or non-native plants to help maintain functioning ecological systems and biological diversity, and to enhance travel corridors. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.5 Implement habitat restoration and/or enhancement activities that include the creation of vegetative buffers between sensitive habitats (e.g., aquatic systems) and human-inhabited areas (e.g., residences, parks, etc.) and that is conducted during appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.3 Create suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats through vegetation management.

2.11.0.13 Implement best management practices (BMPs), protective strategies, and guidelines for vegetation management to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.11.0.32 Increase structural habitat diversity around and when feasible, within agricultural landscapes by managing vegetation for a variety of species, in particular, those farms that have removed scrub-shrub habitat and/or fragmented forests, and by implementing ecologically best practices (e.g., no-till farming, maintaining hedgerows, buffer set-asides, etc.).

2.11.0.33 Increase structural habitat diversity by implementing long-term vegetation management to minimize the potential for the establishment of invasive and/or non-native plants that may outcompete native vegetation.

2.11.0.34 Increase structural habitat diversity by managing residential, commercial and recreational areas' landscapes for a variety of species. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.35 Increase structural habitat diversity by managing vegetation adjacent to aquatic habitats in a manner that provides a buffer from runoff and erosion and a microclimate to stabilize seasonal temperatures to benefit a variety of aquatic and semi-aquatic species.

2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.

2.11.0.37 Increase structural habitat diversity by minimizing the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats which benefits wildlife.

2.11.0.38 Increase structural habitat diversity in and around horse/livestock farms by managing vegetation for a variety of species, in particular, in and around farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

2.11.0.39 Increase structural habitat diversity in and around solar farms by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow setasides.

2.11.0.40 Increase structural habitat diversity surrounding areas used for energy, mining, and transportation and service corridors by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow setasides, and avoid managing habitat during the breeding seasons for ground-nesting birds, reptiles, amphibians and small mammals.

2.11.0.42 Increase structural habitat diversity within wind farms for terrestrial bound and low-flying species and around wind farms for other wildlife by managing vegetation for a variety of species and that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

3 Data Collection and Analysis

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.2 Develop management strategies to improve the availability of prey/food resources for SGCN whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources. Monitor and investigate the management strategies over time to determine success and/or the need to revise methods.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.1.0.25 Provide technical support to public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.27 Develop educational outreach programs for public and private landowners and land managers regarding the importance of structural habitat diversity, methods to increase diversity, and/or incentive programs available to increase habitat diversity.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

9.3.3 Habitat management planning

9.3.3.6 Develop a management plan for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

11 Technical Assistance

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.2 Provide technical support to public and private landowners and land managers for controlling invasive, native and non-native plant species in order to increase structural habitat diversity.

11.2.0.8 Provide educational resources, training programs, and on-the-ground guidance to public and private landowners and land managers on habitat creation and enhancement strategies that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

100 Law and Policy

100.3 State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.73 Develop regulations that would exempt the conversion of lawns to native vegetation (beneficial to wildlife) from local lawn ordinances.

100.4 State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.9 Develop and implement policies to minimize the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats in order to benefit wildlife.

100.4.0.13 Develop policies for different circumstances (e.g., roadsides and medians, riparian, aquatic and terrestrial habitats) that outline appropriate habitat/vegetation management strategies and schedules to minimize risks to and benefit wildlife.

100.4.0.16 Develop policies to implement habitat management strategies that will increase the structural diversity surrounding areas used for energy, mining, and transportation and service corridors which include but are not limited to the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides.

100.4.0.17 Develop policies to implement habitat management strategies, including prescribed burns, that will increase the structural diversity on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies to control and reduce the impacts of invasive, non-native species in order to increase structural habitat diversity.

100.4.0.18 Develop policies to minimize the extent of infrastructure associated with energy and service corridors or areas (e.g., wind and solar farms, pipelines, utility lines) and that require the implementation of habitat management strategies that will increase the structural diversity in the area including (e.g., the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow setasides).

Job 11.02. Scrub-shrub Habitat Management

Project 11. Habitat Management to Improve Ecological Diversity

Objective: Increase state-wide acreage in young forest in 5-10 years by managing for scrub-shrub and young forest habitats within and adjacent to existing forests to achieve up to 15% young forest in appropriate, targeted forest lands.

Purpose: Improve wildlife diversity and enhance habitat for golden-winged warblers and other SGCN dependent upon scrub-shrub or young forest habitat to combat the impacts from a lack of natural disturbances and invasive species on these particular habitats and species.

Benefits: Increase habitat availability and diversity for game and nongame species, and provide an opportunity for improved public relations among corporations and municipalities.

Focal wildlife species benefitting from this job

Birds

American Woodcock	Blue-winged Warbler	Cerulean Warbler
Golden-winged Warbler	Kentucky Warbler	Northern Bobwhite
Red-headed Woodpecker	Scarlet Tanager	Wood Thrush

Macroinvertebrates

A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper
Ashton Cuckoo Bumble Bee	Buchholz's Dart Moth	Buchholz's Gray
Carter's Noctuid Moth	Daecke's Pyralid Moth	Dotted Skipper
Frosted Elfin	Georgia Satyr	Hoary Elfin
Leonard's Skipper	Little White Tiger Beetle	Maritime Sunflower Borer Moth
New England Bluet	New Jersey Pine Barrens Tiger Beetle	Northeastern Beach Tiger Beetle
Northern Metalmark	Papaipema harrisii	Pine Barrens Bluet
Pink Sallow	Robust Baskettail	Rusty Patched Bumble Bee
Sand Myrtle Looper/Pink	Scarlet Bluet	Septima's Clubtail
Southeastern Beach Tiger Beetle	Southern Plains Bumble Bee	Superb Jewelwing
Variable Cuckoo Bumble Bee	Yellow Bumble Bee	Yellow-banded Bumble Bee

Reptiles & Amphibians

Eastern Box Turtle	Wood Turtle

Threats and Action Drivers associated with this conservation need

7 Natural Systems Modifications

7.3 Other Ecosystem Modifications

7.3.4 Lack of natural disturbance patterns or ecosystem functions due to species loss

7.3.4.5 The lack of forest disturbance minimizes the diversity of herbaceous vegetation and other shrubs and trees that need a lot of sunlight to grow.

7.3.5 Poor habitat management

7.3.5.12 Lack of diversity in age structure and composition of vegetation due to lack of natural disturbances and/or vegetation management.

7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species

8.1.1.1 Displace or outcompete native species for resources.

8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.

8.1.1.4 Invasive, non-native animals increase the risk of predation on native animals and/or herbivory on native vegetation.

8.1.1.6 Invasive, non-native plants may create physical barriers for some species.

8.1.5 Invasive non-native terrestrial/wetland plants

8.1.5.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

12 Resource Management Needs

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.28 Create incentives to implement dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

2 Direct Management of Natural Resources

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.11.0.20 Create and/or maintain scrub-shrub habitats through management efforts with little to no impact on forested, wetland and grassland habitats to maintain populations of shrub-dependent SGCN.

2.11.0.45 Regularly and/or rotationally create young forest habitat in targeted areas to maintain and regenerate a mosaic of upland forest habitats that will benefit shrub- and young forest-dependent species.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

100 Law and Policy

100.4 State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

Job 11.03. Scrub-shrub and Young Forest Habitat Management - Outreach and Education

Objective: Provide public and private landowners, land managers and stakeholders with information regarding the importance of and encourage the management for scrub-shrub and young forest habitats over the next 5-10 years.

Purpose: To increase public support for and implementation of management actions that target the creation and/or enhancement of scrub-shrub and young forest habitat.

Benefits: Creation and enhancement of scrub-shrub and young forest habitat for SGCN can increase survivorship and fecundity of these species and help stabilize or reverse population declines.

Focal wildlife species benefitting from this job

Birds

American Woodcock	Blue-winged Warbler	Cerulean Warbler
Golden-winged Warbler	Kentucky Warbler	Northern Bobwhite
Red-headed Woodpecker	Scarlet Tanager	Wood Thrush

Macroinvertebrates

A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper
Ashton Cuckoo Bumble Bee	Buchholz's Dart Moth	Buchholz's Gray
Carter's Noctuid Moth	Daecke's Pyralid Moth	Dotted Skipper
Frosted Elfin	Georgia Satyr	Hoary Elfin
Leonard's Skipper	Little White Tiger Beetle	Maritime Sunflower Borer Moth
New England Bluet	New Jersey Pine Barrens Tiger Beetle	Northeastern Beach Tiger Beetle
Northern Metalmark	Papaipema harrisii	Pine Barrens Bluet

Pink Sallow	Robust Baskettail	Rusty Patched Bumble Bee
Sand Myrtle Looper/Pink	Scarlet Bluet	Septima's Clubtail
Southeastern Beach Tiger Beetle	Southern Plains Bumble Bee	Superb Jewelwing
Variable Cuckoo Bumble Bee	Yellow Bumble Bee	Yellow-banded Bumble Bee

Reptiles & Amphibians

Eastern Box Turtle	Wood Turtle

Threats and Action Drivers associated with this conservation need

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats

14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

8 Outreach

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.5 Develop and provide (or otherwise make publicly available) educational programs and/or materials that provide homeowners information on how to design dwellings and other structures in a manner that is wildlife friendly (e.g., using bird-safe glass on windows).

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

11 Technical Assistance

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.11 Provide educational resources, training programs, and on-the-ground guidance to private and public landowners and land managers on the benefits of and for creating young forest and early succession habitat for SGCN.

Job 11.04. Grassland Habitat Management

Objective: Secure and manage habitat parcels of suitable patch size as grasslands, NJ's most diminishing habitat and most at risk of development, using native herbaceous plantings to support breeding grassland-dependent species in perpetuity.

Purpose: Provide permanent, suitable grassland habitat for grassland-dependent species.

Benefits: Increase the number of individuals of target species and overall biodiversity (plant and animal) while providing natural resource protection (soil, water, air) and recreational benefits to New Jersey's citizens.

Objective: Provide educational materials to public and private landowners and land managers including but not limited to corporations, universities, schools, municipalities, local nurseries, etc., on the importance of grassland habitat and provide technical assistance to assist them in creating, enhancing and properly managing (including timing of activities) grasslands in a manner that will benefit wildlife.

Purpose: Enhance grassland habitats and reduce the implementation of inappropriate management activities (e.g., planting non-native species, inappropriate timing of activities, etc.) to benefit grassland species, particularly birds and invertebrates.

Benefits: Improve public knowledge regarding the creation and/or enhancement of suitable wildlife habitat and best management practices on private and public properties such as appropriate timing of activities to minimize harm to wildlife, proper soil erosion control measures, additional wildlife-focused safety measures when using pesticides and herbicides, and the benefits of increasing suitable wildlife habitat, proper soil erosion control and pesticide use, and appropriate , increase habitat, species response, soil erosion, and pesticide use to increase wildlife habitat and minimize harm to animals during management efforts.

Focal wildlife species benefitting from this job

Birds

Blue-winged Warbler	Bobolink	Eastern Meadowlark
Grasshopper Sparrow	Northern Bobwhite	Northern Harrier
Vesper Sparrow		

Macroinvertebrates

A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper
Ashton Cuckoo Bumble Bee	Buchholz's Dart Moth	Buchholz's Gray
Carter's Noctuid Moth	Daecke's Pyralid Moth	Dotted Skipper
Frosted Elfin	Georgia Satyr	Hoary Elfin
Leonard's Skipper	Maritime Sunflower Borer Moth	New Jersey Pine Barrens Tiger Beetle
Pink Sallow	Rusty Patched Bumble Bee	Sand Myrtle Looper/Pink
Scarlet Bluet	Southern Plains Bumble Bee	Superb Jewelwing
Variable Cuckoo Bumble Bee	Yellow Bumble Bee	Yellow-banded Bumble Bee

Reptiles & Amphibians

Eastern Box Turtle	Eastern Redbelly Turtle	Wood Turtle

Threats and Action Drivers associated with this conservation need

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture

2.1.1.5 Lack of competitive market prices to maintain native grasslands causes conversion to other crops that have more monetary value but less value as wildlife habitat.

2.1.2 Small-holder Farming

2.1.2.5 Lack of competitive market prices to maintain native grasslands causes conversion to other crops that have more monetary value but less value as wildlife habitat.

2.1.3 Agro-industry

2.1.3.6 Lack of competitive market prices to maintain native grasslands causes conversion to other crops that have more monetary value but less value as wildlife habitat.

7 Natural Systems Modifications

7.3 Other Ecosystem Modifications

7.3.5 Poor habitat management

7.3.5.6 Habitat management, including that which occurs on public and private lands, that does not consider timing and species' behaviors can result in the direct mortality and/or alteration or loss of habitat.

7.3.5.12 Lack of diversity in age structure and composition of vegetation due to lack of natural disturbances and/or vegetation management.

7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

7.3.5.18 Lack of funding or competitive market prices to maintain native grasslands for grassland-dependent species causes conversion of fallow or hay fields to other crops or shrublands.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.24 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners, with habitat of suitable patch size to support breeding grassland-dependent species, to alter the timing of vegetation management to benefit grassland and pollinator species.

1.2.1.28 Create incentives to implement dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

2 Direct Management of Natural Resources

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

3 Data Collection and Analysis

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.29 Explore the use of alternative vegetation (i.e., commodity crops) to address agriculture concerns.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.15 Engage government agencies, conservation partners and other stakeholders in discussions encouraging and supporting the creation of laws and policies requiring vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.28 Develop educational outreach programs for public and private landowners and land managers regarding the importance of managing grasslands for grassland-dependent species, methods of management, and/or incentive programs available.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

9.3.3 Habitat management planning

9.3.3.26 Develop a management plan for parcels of suitable size to be managed for native herbaceous plant species that support breeding grassland dependent species.

11 Technical Assistance

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.12 Provide educational resources and technical support to public landowners and land managers for managing grasslands for grassland-dependent species.

100 Law and Policy

100.1 Legislation

100.1.2 National Level

100.1.2.1 Create legislation to establish markets for warm-season grasses to increase the permanency of this crop on the landscape.

100.3 State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.24 Create legislation to establish markets for warm-season grasses to increase the permanency of this crop on the landscape.

100.3.0.40 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.4 State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.3 Develop policies for mandatory buffer strips on preserved farmlands and state-owned agricultural lands.

100.4.0.12 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.4.0.14 Develop policies to facilitate agreements between eligible entities to manage appropriate conserved lands for grassland-dependent species, and to have access to/obtain restoration funds.

Job 11.05. Landscape Level Forest Management Planning

Objective: Identify regional deficiencies in forest habitats (i.e., limiting habitat factors on the landscape such as a lack of structural diversity, distribution of forest types and age classes, lack of critical SGCN breeding habitats, etc.) for focal SGCN using existing tools such as as forest inventory analysis, landscape project, etc.

Purpose: Improve forest habitat management decisions and efforts to benefit focal SGCN.

Benefits: Final products will contribute to forest management and planning to increase the diversity of habitats within New Jersey's forests and provide opportunities for collaboration between various entities, land managers, and landowners to focus forest management efforts.

Focal wildlife species benefitting from this job

Birds

American Woodcock	Blue-winged Warbler	Cerulean Warbler
Golden-winged Warbler	Kentucky Warbler	Northern Bobwhite
Peregrine Falcon	Prothonotary Warbler	Red-headed Woodpecker
Scarlet Tanager	Wood Thrush	

Fish

Alewife	Banded Sunfish	Blackbanded Sunfish
Blueback Herring	Bridle Shiner	Brook Trout
Comely Shiner	Ironcolor Shiner	Mud Sunfish
Swamp Darter		

Macroinvertebrates

American Bumble Bee	Arogos Skipper	Ashton Cuckoo Bumble Bee
Brook Floater	Dotted Skipper	Dwarf Wedgemussel
Eastern Lampmussel	Frosted Elfin	Georgia Satyr
Green Floater	Hoary Elfin	Leonard's Skipper
Little White Tiger Beetle	Maritime Sunflower Borer Moth	New England Bluet
New Jersey Pine Barrens Tiger Beetle	Northern Metalmark	Papaipema harrisii
Pine Barrens Bluet	Robust Baskettail	Rusty Patched Bumble Bee
Scarlet Bluet	Septima's Clubtail	Southeastern Beach Tiger Beetle
Southern Plains Bumble Bee	Superb Jewelwing	Triangle Floater
Variable Cuckoo Bumble Bee	Yellow Bumble Bee	Yellow Lampmussel
Yellow-banded Bumble Bee		

Mammals

Allegheny Woodrat	Indiana Bat	Little Brown Bat
Northern Myotis		

Reptiles & Amphibians

Carpenter Frog	Eastern Box Turtle	Eastern Hognose Snake
Eastern Spadefoot	Eastern Tiger Salamander	Longtail Salamander
New Jersey Chorus Frog	Northern Black Racer	Northern Red Salamander
Pine Barrens Treefrog	Timber Rattlesnake	Wood Turtle

Threats and Action Drivers associated with this conservation need

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory

12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.2 Lack of up-to-date existing information

12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

3 Data Collection and Analysis

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

3.3.1.7 Map and prioritize existing and potential areas for early succession forest management. Share the results with state, county and municipal planners.

3.3.1.8 Assess the availability and suitability of forest habitats for SGCN species (particularly reptiles and amphibians, birds, pollinators, and tiger beetles) in southern forests since Superstorm Sandy.

3.3.1.9 Inventory forests throughout northern New Jersey to develop a baseline characterization of the structure and composition of habitats and identify deficient forest habitat types.

3.3.1.12 Conduct an initial assessment of and document the availability and suitability of intact, preserved forest blocks containing vernal pools within the possible range of Eastern Tiger Salamander, which appear under-represented on a landscape scale. Incorporate findings into a database that includes descriptions and qualifiers of the habitats, and a GIS component of the locations of such areas. Share this information with appropriate organizations and/or agencies working to implement habitat restoration and enhancement strategies to provide opportunities for this salamander to disperse and expand its current range.

3.3.1.17 Identify and map undeveloped roads and trails in all conserved forests, and create a database of locations. Integrate information regarding potentially sensitive areas.

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.2 Monitoring

3.3.2.1 Evaluate the effectiveness of forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

3.3.2.9 Investigate the effectiveness of various silviculture techniques for enhancing forests for forest-dependent SGCN.

3.3.2.17 Conduct long-term habitat monitoring to determine the continued availability and suitability of intact, preserved forest blocks containing vernal pools within the possible range of Eastern Tiger Salamander. Update the database (to be developed during baseline assessments) regarding the forests' and vernal pools' conditions. Share this information with appropriate organizations and/or agencies working to implement habitat restoration and enhancement strategies to provide opportunities for this salamander to disperse and expand its current range.

3.3.2.24 Conduct regular inventories of forests throughout northern New Jersey to characterize the changing structure and composition of habitats and monitor forest conditions.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

100 Law and Policy

100.4 State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

Job 11.06. Forest Management in Southern New Jersey

Objective: Develop and implement a Forest Stewardship Plan for 1.2 million acres of Southern New Jersey forests by 2026, with management underway on 250,000 acres.

Purpose: Manage more lands for healthy forests to increase diversity of forest-dwelling wildlife species and improve their chances to persist.

Benefits: Creation and enhancement of forested habitats can increase survivorship and fecundity of SGCN and help stabilize or reverse population declines. Appropriate forest management will also improve habitat connectivity while reducing/minimizing fragmentation, can increase resiliency to the threat of pests, and can improve public safety from wild fires by creating appropriate buffers and minimizing forest litter (i.e., "fuel") proximate to residences and roads (Wildland Urban Interface).

Focal wildlife species benefitting from this job

Birds

American Woodcock	Blue-winged Warbler	Cerulean Warbler
Kentucky Warbler	Northern Bobwhite	Prothonotary Warbler
Red-headed Woodpecker	Scarlet Tanager	Wood Thrush

Fish

Alewife	Banded Sunfish	Blackbanded Sunfish
Blueback Herring	Brook Trout	Ironcolor Shiner
Mud Sunfish	Swamp Darter	

Macroinvertebrates

A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper
Ashton Cuckoo Bumble Bee	Buchholz's Dart Moth	Buchholz's Gray
Carter's Noctuid Moth	Daecke's Pyralid Moth	Dotted Skipper
Frosted Elfin	Georgia Satyr	Hoary Elfin
Leonard's Skipper	Maritime Sunflower Borer Moth	New Jersey Pine Barrens Tiger Beetle
Pine Barrens Bluet	Pink Sallow	Robust Baskettail
Rusty Patched Bumble Bee	Sand Myrtle Looper/Pink	Scarlet Bluet
Southern Plains Bumble Bee	Triangle Floater	Variable Cuckoo Bumble Bee
Yellow Bumble Bee	Yellow Lampmussel	Yellow-banded Bumble Bee

Mammals

Little Brown Bat	Northern Myotis

Reptiles & Amphibians

Carpenter Frog	Corn Snake	Eastern Box Turtle
Eastern Hognose Snake	Eastern Spadefoot	Eastern Tiger Salamander

New Jersey Chorus Frog	Northern Black Racer	Northern Pine Snake
Northern Red Salamander	Northern Scarlet Snake	Pine Barrens Treefrog
Timber Rattlesnake	Wood Turtle	

Threats and Action Drivers associated with this conservation need

5 Biological Resource Use

5.3 Logging and Wood Harvesting

5.3.1 Intentional Use (subsistence/small scale)

5.3.1.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.1.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.1.6 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices in Atlantic White Cedar stands may destroy a unique wildlife wetland habitat that is difficult, and takes time, to restore.

5.3.2 Intentional Use (large scale)

5.3.2.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.2.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.2.6 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices in Atlantic White Cedar stands may destroy a unique wildlife wetland habitat that is difficult, and takes time, to restore.

7 Natural Systems Modifications

7.1 Fire and Fire Suppression

7.1.1 Increase in Fire Frequency/Intensity

7.1.1.1 Increase in frequency and intensity of wild fires as a result of droughts and heat waves drying out vegetation and litter.

7.1.1.4 Lack of diversity in age structure and composition of vegetation due to expansive, frequent fires.

7.1.2 Suppression of Fire Frequency/Intensity

7.1.2.1 Shift in vegetative communities as a result of suppression of natural fires.

7.1.2.2 Lack of diversity in age structure and composition of vegetation due to the suppression of fire.

7.3 Other Ecosystem Modifications

7.3.4 Lack of natural disturbance patterns or ecosystem functions due to species loss

7.3.4.4 Human interference in natural processes such as clean up (e.g., beach-filling, shoreline hardening, tree/log removal from forests) after storms, in particular those causing post-hurricane washover and/or barrier island westward movement, and tree felling limits the disturbance needed to maintain appropriate habitats for wildlife.

7.3.4.5 The lack of forest disturbance minimizes the diversity of herbaceous vegetation and other shrubs and trees that need a lot of sunlight to grow.

7.3.5 Poor habitat management

7.3.5.5 Habitat management that alters or removes vegetation without implementing long-term management increases the risk of invasive and exotic plants establishing themselves, outcompeting native vegetation.

7.3.5.6 Habitat management, including that which occurs on public and private lands, that does not consider timing and species' behaviors can result in the direct mortality and/or alteration or loss of habitat.

7.3.5.14 Intentional felling and removal of dead standing trees or snags eliminates resting, nesting or feeding habitat, and precludes the snags eventual contribution to coarse woody debris and forest floor structure and habitat.

7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.2 Lack of up-to-date existing information

12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats

14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

2 Direct Management of Natural Resources

2.3 Fire management

2.3.2 Fuel reduction

2.3.2.1 Prevent wildfires by reducing natural fuel (e.g., leaf litter).

2.3.3 Prescribed burning

2.3.3.3 Conduct prescribed burning to improve wildlife habitat.

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.18 Implement forest management/silvicultural strategies that promote the development of new old-growth forests and/or minimize the loss of old-growth forest stands with large trees and within large, contiguous tracts.

2.11.0.19 Implement forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN.

2.11.0.33 Increase structural habitat diversity by implementing long-term vegetation management to minimize the potential for the establishment of invasive and/or non-native plants that may outcompete native vegetation.

2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.

2.11.0.37 Increase structural habitat diversity by minimizing the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats which benefits wildlife.

2.11.0.41 Increase structural habitat diversity through the implementation of a variety of vegetation management practices such a prescribed burns (either increasing or decreasing their frequency depending on the site and objective), plantings, etc. that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife.

2.11.0.43 Manage forests to increase variation in age structure and composition using BMPs that promote and maintain functioning ecological forest-based systems and biological diversity.

3 Data Collection and Analysis

3.3 Research, survey or monitoring - habitat

3.3.2 Monitoring

3.3.2.1 Evaluate the effectiveness of forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN through research and monitoring.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.24 Engage government agencies, conservation partners and other stakeholders in constructive dialogue regarding the importance of providing and methods to provide technical support for carrying out restoration and management practices aimed at increasing structural habitat diversity.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

9.3.3 Habitat management planning

9.3.3.6 Develop a management plan for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

100 Law and Policy

100.4 State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

Job 11.07. Wetlands Restoration and Integrated Management

Objective: Implement a wetlands habitat restoration plan, particularly in wetlands impacted by development, agriculture, climate change, pollution, etc., with a focus on freshwater herbaceous and shrubland habitats for degraded wetlands that integrates the management of focal SGCN with rare plant conservation in the interest of biodiversity protection and ecosystem health.

Purpose: Maintain or improve biodiversity and ecosystem health within wetland habitats.

Benefits: Restoring wetland habitat creates higher quality, functioning systems that benefit SGCN (and associated rare plant species), and improves resiliency to stressors and ecological integrity, improving and/or securing long term viability for habitat and wildlife.

Focal wildlife species benefitting from this job

Birds

American Woodcock	Black Rail	Blue-winged Warbler
Bobolink	Cerulean Warbler	Eastern Meadowlark
Golden-winged Warbler	Grasshopper Sparrow	Kentucky Warbler
Little Blue Heron	Northern Harrier	Pied-billed Grebe
Prothonotary Warbler	Red Knot	Ruddy Turnstone
Scarlet Tanager	Snowy Egret	Tricolored Heron
Vesper Sparrow	Wood Thrush	

Fish

Banded Sunfish	Blackbanded Sunfish	Mud Sunfish
Swamp Darter		

Macroinvertebrates

Arogos Skipper	Brook Floater	Buchholz's Dart Moth
Buchholz's Gray	Carter's Noctuid Moth	Daecke's Pyralid Moth
Dwarf Wedgemussel	Eastern Lampmussel	Georgia Satyr
Green Floater	New England Bluet	Papaipema harrisii
Pine Barrens Bluet	Pink Sallow	Robust Baskettail
Sand Myrtle Looper/Pink	Septima's Clubtail	Superb Jewelwing
Triangle Floater	Yellow Lampmussel	

Mammals

Indiana Bat	Little Brown Bat	Northern Myotis

Reptiles & Amphibians

Bog Turtle	Carpenter Frog	Eastern Box Turtle
Eastern Spadefoot	Eastern Tiger Salamander	Longtail Salamander
New Jersey Chorus Frog	Northern Diamondback Terrapin	Northern Red Salamander
Pine Barrens Treefrog	Timber Rattlesnake	Wood Turtle

Threats and Action Drivers associated with this conservation need

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale)

1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.1.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale)

1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.2.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.

1.2.1.5 Impervious surfaces can lead to a decrease in water recharge.

1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.2.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture

2.1.1.4 Salt hay farming on Delaware Bay marshes, and the subsequent conversion of those farms to fully tidal marshes, results in compressed sediments that are less resilient to coastal forces of erosion and sea level rise.

2.4 Marine and Freshwater Aquaculture

2.4.1 Subsistence/Artisinal Aquaculture

2.4.1.1 May degrade freshwater and intertidal habitat due to farming techniques and damage from associated structures.

2.4.1.3 Potential for increased nutrient and effluent loads.

2.4.1.6 Potential for aquaculture structures to create impingement/entanglement hazard and/or preclude benthic habitat use by SGCN.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale)

4.1.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species and inhibiting dispersal of non-volant animals, reducing gene flow.

4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads

4.2.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species, inhibiting dispersal of non-volant animals, reducing gene flow, and creating barriers to fish when service line-associated roads cross streams (e.g., bridges, culverts, fords, etc).

4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

4.2.1.4 Lines that cross or run parallel to streams result in a loss or reduction of vegetated riparian buffers and streamside shading, affecting water quality and in-stream habitat for aquatic biota.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized)

6.1.1.1 Inappropriate use of off-road vehicles creates new roads/trails which fragments habitat.

6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.

6.1.1.3 Increased risk of harassment that results in a change in wildlife behavior and/or direct mortality from vehicle strikes.

6.1.1.4 Increased noise pollution.

6.1.1.6 Off-road vehicles can be a mechanism of transference of wildlife diseases and invasive plant species if gear and apparel are not properly sanitized between sites.

6.1.5 Wildlife observation and photography

6.1.5.1 Improperly conducted recreational activities may disrupt normal wildlife behaviors which can result in reduced reproductive success or survival, abandonment of critical sites, etc.

6.1.5.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.1.7 Other: Recreational activities (such as pyrotechnics or drones) that may disrupt normal wildlife activities, or recreation that results in transfer of pathogens deleterious to wildlife.

6.1.7.3 Drone use in areas with sensitive wildlife (e.g., nesting and foraging birds, migrating and foraging/feeding whales) can alter their behavior and can cause disturbance that impacts their reproductive and/or foraging success.

7 Natural Systems Modifications

7.2 Dams and Water Management/Use

7.2.1 Abstraction of Surface Water (domestic use)

7.2.1.1 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.3 Abstraction of Surface Water (agricultural use)

7.2.3.3 Impounding water to create or expand bogs for cranberry farming leads to the loss of natural wetlands and the alteration of the natural hydrology in the area.

7.2.5 Abstraction of Ground Water (domestic use)

7.2.5.1 Heavy withdrawal of ground water for domestic use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.7 Abstraction of Ground Water (agricultural use)

7.2.7.1 Heavy withdrawal of ground water for agricultural use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.3 Other Ecosystem Modifications

7.3.5 Poor habitat management

7.3.5.4 Vegetation clearing or inappropriate alteration adjacent to aquatic habitats threatens aquatic species by degrading habitat and water quality (altering temperature and dissolved oxygen, increasing siltation and dessication, etc.).

7.3.5.5 Habitat management that alters or removes vegetation without implementing long-term management increases the risk of invasive and exotic plants establishing themselves, outcompeting native vegetation.

7.3.5.9 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, eliminates shallow water habitats, and disrupts/removes stream bottom habitat.

7.3.5.10 Ditching, draining and filling of marshes and wetlands eliminates habitat and degrades the remaining surrounding areas for wildlife.

7.3.5.12 Lack of diversity in age structure and composition of vegetation due to lack of natural disturbances and/or vegetation management.

7.3.5.13 Private landowners with rare species on their properties are not always cooperative in the protection and management of the species' habitats. Landowners may be held accountable for their actions when they cause harm to the species or destroy the habitat, but it is often too late for the species' population.

7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

7.3.5.16 Lack of proactive management to preserve or maintain viable and functioning marshes for SGCN wildlife.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species

8.1.1.1 Displace or outcompete native species for resources.

8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.

8.1.1.3 Invasive, non-native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

8.1.1.4 Invasive, non-native animals increase the risk of predation on native animals and/or herbivory on native vegetation.

8.1.1.5 Invasive, non-native animals and plants increase the risk of introduction and transference of diseases.

8.1.1.6 Invasive, non-native plants may create physical barriers for some species.

8.1.2 Invasive non-native aquatic animals

8.1.2.1 Parasites introduced into the marine environment can alter the reproductive and feeding behavior of native wildlife, leading to their decline.

8.1.2.2 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminishing habitat suitability and reducing ecological integrity of natural communities, and may introduce disease into a population.

8.1.3 Invasive non-native aquatic plants

8.1.3.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.4 Invasive non-native terrestrial/wetland animals

8.1.4.1 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.4.2 Free-roaming and feral domestic animals such as cats and dogs causes direct mortality of wildlife and disturbance to wildlife breeding and resting areas.

8.1.5 Invasive non-native terrestrial/wetland plants

8.1.5.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.2 Problematic Native Species/Diseases

8.2.1 Unspecified Species

8.2.1.1 Overabundant native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

8.2.1.2 Invasive pathogens and insects may increase in range and abundance as limiting factors (such as temperature) are altered as a result of climate change.

8.2.1.3 Invasive, native species can out-compete non-invasive species for resources (food, light, shelter), leading to the demise of some species populations.

8.2.1.4 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.2.2 Named Species

8.2.2.2 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.4.2 Named Species

8.4.2.1 Honey bee diseases such as Deformed Wing Virus(DWV) and Nosema ceranae have been found to able to be transmitted to wild bumble bees.

8.4.2.2 Diseases of unknown origin, such as snake fungal disease and Ranavirus, can cause significant mortality among native animal populations.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases

8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations

11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.2 Droughts

11.2.1 Droughts

11.2.1.1 Contribute to hardened soils, decreasing water recharge during rains and increasing the likelihood of flash floods during storms.

11.2.1.2 Lead to lower groundwater levels and therefore, less available water for people and habitats.

11.2.1.3 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

11.2.1.6 Increased dessication risk for amphibians and altered wetland hydrology for critical habitats including breeding pools.

11.3 Temperature Extremes

11.3.1 Temperature extremes

11.3.1.1 Increasing temperatures may cause habitat loss and degradation by desiccating and/or raising the temperatures of small wetlands and streams leading to the loss of freshwater mussels and other aquatic species and species reliant upon these habitats.

11.3.1.2 Increased temperatures can negatively impact wetland, riverine, lacustrine and vernal pool-associated or -dependent wildlife by reducing flows, increasing water temperatures, lowering water levels and causing premature drying of vernal habitats.

11.4 Storms and Flooding

11.4.1 Storms and flooding

11.4.1.1 Extreme storms and flooding events threaten aquatic and marine wildlife through habitat degradation and alteration, including alterations to off-shore or back-bay benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic and marine wildlife.

11.4.1.2 Potentially damage coastal habitats, including beach- and marsh-nesting bird habitats and interdunal wetlands, and can increase marsh erosion.

11.4.1.3 Increase risk of saltwater intrusion to freshwater habitats altering the water chemistry and potentially altering aquatic wildlife community.

11.4.1.4 Flood events alter river or stream morphology, benthic conditions and habitat availability for wildlife, cause bank erosion, and deposit sediments in floodplain wetlands altering wildlife habitat.

11.4.1.5 Storm damage can alter forest structure via blow-downs or micro-bursts, and can destroy bird nesting in the locales where the storms occur.

11.4.2 Increased rainfall

11.4.2.1 Extreme rain events threaten aquatic wildlife through habitat degradation and alteration, including alterations to benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic wildlife.

11.4.2.2 Extreme rain events can damage wildlife nesting and resting habitats, including impacts to avian eggs and chick and small mammal survivorship.

11.4.2.3 More frequent rain events can alter terrestrial and wetland vegetation communities as well as wetland hydrology, shifting wildlife community use.

11.5 Sea-level Rise

11.5.0 Sea-level Rise

11.5.0.2 Increased risk of saltwater intrusion into freshwater systems impacting associated wildlife and native vegetation.

12 Resource Management Needs

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

2 Direct Management of Natural Resources

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.1 Control invasive insect infestations by implementing BMP strategies through biological, chemical and/or mechanical means that will depress, or when appropriate, eradicate populations in a manner that avoids excessive harm to non-target species using BMPs to control infestations and limit their spread based on an inventory of invasive insect distribution and response to outbreaks.

2.8.0.2 Develop, implement, monitor and evaluate pest control/management strategies to reduce the impacts of over-abundant wildlife species (native and/or native, invasive species) on native vegetation and the degradation of habitats supporting SGCN. Over-abundant wildlife species include but are not limited to mute swans, Canada geese, beaver and white-tailed deer.

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.11.0.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through vegetation management .

2.11.0.8 Maintain, enhance and/or restore biologically appropriate buffers for SGCN-inhabited/used freshwater wetlands through vegetation management.

2.11.0.21 Minimize the degradation, alteration and/or changes in hydrology of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and subsequent disturbances to and behavioral changes of wildlife by maintaining or enhancing these areas and biologically appropriate buffers through habitat management and/or revegetation or restoration efforts.

2.13 Wildlife damage management

2.13.0 Nuisance fish and wildlife damage

2.13.0.7 Develop, implement, monitor and evaluate management strategies to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

2.13.0.8 Implement and assess management strategies to control and reduce the impacts of detrimental species and diseases that pose threats to native wildlife or communities.

3 Data Collection and Analysis

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.5 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.6 Develop/improve management strategies to repair marshes and associated beaches damaged by salt hay farm/dike abandonment for all bay shore areas currently degraded.

3.5.3.16 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.21 Develop BMPs to address problematic species and diseases of unknown origin.

7 Law Enforcement

7.1 Law enforcement

7.1.4 Scale Unspecified

7.1.4.6 Recruit law enforcement to assist in the protection and enhancement of SGCN populations, in particular endangered species, through improved awareness of species through trainings, partnerships, and other methods. Information should include but is not limited to: 1) Issues concerning illegal collection of reptiles, 2) Persecution of rare snakes, 3) Illegal recreational activities on public lands (e.g., off-road vehicles) and their impact on wildlife, 4) Identification of sensitive areas, critical sites and/or "hot-spots" for collection.

7.1.4.7 Increase law enforcement presence to enforce regulations governing recreational activities (e.g., the use of personal watercraft and off road vehicles, caving, rock climbing, etc.) on conserved lands and within other sensitive habitats, and discourage activities that cause harm or disturbance to vegetation, wetlands, fish and wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.33 Engage government agencies, conservation partners and other land managers, communities, landowners, and commercial and industrial stakeholders in discussions regarding the importance of protecting and methods to protect priority wetlands beyond the levels afforded through regulation by maintaining and/or restoring optimal biological buffers around wetlands.

8.1.0.40 Encourage researchers, land managers, naturalists and enthusiasts to follow proper procedures for the coordination and/or permitting of research/management activities involving wildlife and sensitive habitats, and discourage activities that alter vegetation or wetlands, or cause harm or disturbance to wildlife.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.4 Develop a plan that directs the creation of new impoundments and/or the expansion of bogs for cranberry farming within or immediately adjacent to critical forested habitats in a manner that minimizes impacts on the natural hydrology of the watershed and subsequently, the natural wetlands in the area.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.28 Develop and coordinate state, regional and local plans for suitable lot layout and landscaping to minimize human-wildlife conflicts that also incorporates habitat connectivity and preservation of natural areas.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.1.0.31 Develop wetland restoration plans that consider the life history and needs of wildife occupying targeted habitats.

9.1.0.32 Incorporate aquatic habitat connectivity and water quality/effluent standards into local and state aquaculture plans and BMPs.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

9.3.3 Habitat management planning

9.3.3.6 Develop a management plan for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

9.3.3.13 Develop a management plan that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas and prevents or ameliorates near-term impacts of climate change throughout the State, but in particular within the coastal and Delaware Bay areas.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.3 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildife occupying the targeted habitats.

11.1.1.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.2 Review of proposed policies and plans

11.1.2.2 Government organizations to thoroughly review wetland restoration plans, applying the most current science for wildlife, habitats and aquatic systems, to assess the impacts to resident and migratory wildife occupying the targeted habitats.

11.1.2.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into the environmental review process to help establish policies and plans that minimize the impact of aquaculture on fish and wildlife.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.3 Develop state, regional and local BMPs that focus on minimizing habitat fragmentation and human-wildlife conflicts associated with development. Make information available to land developers and private and public landowners for implementation.

11.2.0.14 Provide educational resources and technical support to public and private landowners and land managers to promote the protection of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters), and to enhance or restore biologically appropriate buffers.

100 Law and Policy

100.1 Legislation

100.1.3 Sub-national Level

100.1.3.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildife occupying targeted habitats.

100.1.4 County and Local

100.1.4.15 Incorporate habitat connectivity and the preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and related threats associated with development.

100.1.5 Scale Unspecified

100.1.5.2 Develop policies for wetland restoration plans that consider life history requirements and needs of wildife occupying targeted habitats.

100.1.5.3 Incorporate aquatic habitat connectivity and water quality/effluent standards into state/local policy to minimize the impact of aquaculture on fish and wildlife.

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100.4 State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

Job 11.08. Riparian Restoration

Objective: Increase the total area of vegetated riparian buffers statewide in an effort to reduce human impacts along stream corridors by recruiting public and private landowners to maintain and/or enhance riparian areas through educational materials, incentive programs and, where appropriate, regulations.

Purpose: Restore the natural physical, chemical and biological features of and minimize the impacts of human activities on aquatic habitats.

Benefits: Riparian restoration can decrease stream temperatures, reduce flashiness through a restored natural flow regime, reduce erosion through stabilized banks, filter pollutants, reduce sediments, and protect most species of fish, mussels, odonates, and salamanders.

Focal wildlife species benefitting from this job

Fish

Alewife	Atlantic Sturgeon	Banded Sunfish
Blackbanded Sunfish	Blueback Herring	Bridle Shiner
Brook Trout	Comely Shiner	Ironcolor Shiner
Mud Sunfish	Shortnose Sturgeon	Swamp Darter

Macroinvertebrates

Brook Floater	Dwarf Wedgemussel	Eastern Lampmussel
Green Floater	New England Bluet	Papaipema harrisii
Pine Barrens Bluet	Robust Baskettail	Scarlet Bluet
Septima's Clubtail	Superb Jewelwing	Triangle Floater
Yellow Lampmussel		

Mammals

Indiana Bat	Little Brown Bat	Northern Myotis

Reptiles & Amphibians

Bog Turtle	Eastern Redbelly Turtle	Longtail Salamander
Northern Diamondback Terrapin	Northern Red Salamander	Timber Rattlesnake
Wood Turtle		

Threats and Action Drivers associated with this conservation need

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale)

1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.1.1.2 Loss, alteration and/or degradation of habitat.

1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.1.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale)

1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.2.1.2 Loss, alteration and/or degradation of habitat.

1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.2.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale)

1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.3.1.2 Loss, alteration and/or degradation of habitat.

1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.3.1.6 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale)

4.1.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species and inhibiting dispersal of non-volant animals, reducing gene flow.

4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads

4.2.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species, inhibiting dispersal of non-volant animals, reducing gene flow, and creating barriers to fish when service line-associated roads cross streams (e.g., bridges, culverts, fords, etc).

4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

7 Natural Systems Modifications

7.3 Other Ecosystem Modifications

7.3.5 Poor habitat management

7.3.5.4 Vegetation clearing or inappropriate alteration adjacent to aquatic habitats threatens aquatic species by degrading habitat and water quality (altering temperature and dissolved oxygen, increasing siltation and dessication, etc.).

9 Pollution

9.1 Domestic and Urban Waste Water

9.1.2 Run-off

9.1.2.1 Chemical fertilizers and nutrient run-off changes the pH in streams and ponds and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.1.2.2 Contaminants degrade aquatic and marine water quality and can bioaccumulate in benthic organisms, threatening wildlife by causing developmental and behavioral abnormalities and reproductive failure.

11 Climate Change and Severe Weather

11.2 Droughts

11.2.1 Droughts

11.2.1.1 Contribute to hardened soils, decreasing water recharge during rains and increasing the likelihood of flash floods during storms.

11.2.1.3 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

11.3 Temperature Extremes

11.3.1 Temperature extremes

11.3.1.1 Increasing temperatures may cause habitat loss and degradation by desiccating and/or raising the temperatures of small wetlands and streams leading to the loss of freshwater mussels and other aquatic species and species reliant upon these habitats.

11.3.1.2 Increased temperatures can negatively impact wetland, riverine, lacustrine and vernal pool-associated or -dependent wildlife by reducing flows, increasing water temperatures, lowering water levels and causing premature drying of vernal habitats.

11.4 Storms and Flooding

11.4.1 Storms and flooding

11.4.1.1 Extreme storms and flooding events threaten aquatic and marine wildlife through habitat degradation and alteration, including alterations to off-shore or back-bay benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic and marine wildlife.

11.4.1.4 Flood events alter river or stream morphology, benthic conditions and habitat availability for wildlife, cause bank erosion, and deposit sediments in floodplain wetlands altering wildlife habitat.

11.4.2 Increased rainfall

11.4.2.1 Extreme rain events threaten aquatic wildlife through habitat degradation and alteration, including alterations to benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic wildlife.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.6 Secure and promote the protection/restoration of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers through incentive programs.

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.12 Create incentives (non-monetary and/or monetary) for land developers to redevelop abandoned areas (e.g., shopping centers, office complexes) to minimize the loss of natural habitats and reduce the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

2 Direct Management of Natural Resources

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.1 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts,etc.).

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.16 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.11.0.21 Minimize the degradation, alteration and/or changes in hydrology of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and subsequent disturbances to and behavioral changes of wildlife by maintaining or enhancing these areas and biologically appropriate buffers through habitat management and/or revegetation or restoration efforts.

2.11.0.35 Increase structural habitat diversity by managing vegetation adjacent to aquatic habitats in a manner that provides a buffer from runoff and erosion and a microclimate to stabilize seasonal temperatures to benefit a variety of aquatic and semi-aquatic species.

7 Law Enforcement

7.1 Law enforcement

7.1.4 Scale Unspecified

7.1.4.16 Implement policies that protect and restore riparian areas.

8 Outreach

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.29 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about the importance of maintaining a vegetative buffer along riparian and aquatic habitats to intercept stormwater runoff and minimize soil erosion.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and the SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.5 Develop a plan that directs the creation or expansion of energy or utility rights-of-way in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.6 Develop a plan that directs the creation or expansion of roads and railroads or the re-establishment of abandoned railroads within and adjacent to critical forested habitats in a manner that minimizes the impacts on critical forested habitats and the wildlife community.

9.1.0.15 Develop a plan to minimize fragmentation of terrestrial and aquatic habitats by roads.

9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.29 Provide GIS or related data, maps, resource inventories, as well as related training, pertaining to the SWAP and it's recommended conservation actions for use or consideration by State, County or municipal planning agencies.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

11 Technical Assistance

11.2 Technical assistance

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.2 Provide professional training and technical assistance tools (e.g., mapping, guidance documents, justification, etc.) to agencies/divisions/programs within and outside of the NJ DEP regarding the SWAP, and the conservation actions recommended therein to help facilitate SWAP implementation.

100 Law and Policy

100.1 Legislation

100.1.4 County and Local

100.1.4.4 Secure wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and biologically appropriate buffers through local ordinances.

100.3 State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.14 Develop policies and/or regulations that increase the protective buffers of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) to biologically appropriate distances to benefit SGCN that rely upon these habitats and improve the function of the [associated] aquatic systems.

100.4 State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

Job 11.09. Create Vernal Pools

Objective: Identify specific areas in conditionally secure, preserved, intact and/or under-represented habitats where vernal pool creation will benefit and expand opportunities for obligate vernal pool breeders and related herpetofauna, in particular where populations have suffered from habitat loss or fragmentation, climate change impacts, disease, etc.). Create one new breeding habitat per year for at least 10 consecutive years. Pools should be long cycle ephemeral pools situated within, ideally, at least 300 acres of intact forest or scrubshrub/young forest habitat, and, ideally, should have a minimum 300m vegetated dispersal habitat in all directions
unless created for the purpose of "connectivity" of metapopulations.

Purpose: Assist the long-term persistence of vernal pool breeders.

Benefits: Encourage the dispersal of vernal pool obligate species and range adaption to offset the impacts of sea level rise and subsequent salt water intrusion into existing aquatic systems. Such actions will diversity forest habitat for SGCN and will enhance vernal pool species' resilience to the impacts of climate change, enable them to expand their ranges and promote genetic exchange, in particular those currently with limited range (e.g., Eastern Tiger Salamander), and consequently, improve their resistance to catastrophic population impacts as a result of local disease(s).

Focal wildlife species benefitting from this job

Reptiles & Amphibians

Carpenter Frog	Eastern Box Turtle	Eastern Spadefoot
Eastern Tiger Salamander	Longtail Salamander	New Jersey Chorus Frog
Pine Barrens Treefrog	Wood Turtle	

Threats and Action Drivers associated with this conservation need

5 Biological Resource Use

5.3 Logging and Wood Harvesting

5.3.3 Unintentional effects (subsistence/small scale)

5.3.3.2 Poorly planned/implemented tree harvesting adjacent to waterways and vernal pools can lead to increased water temperatures, soil erosion and sedimentation, and reduces the potential for woody debris within the aquatic system, leading to negative impacts on wildlife.

5.3.4 Unintentional effects (large scale)

5.3.4.3 Poorly planned/implemented tree harvesting adjacent to waterways and vernal pools can lead to increased water temperatures, soil erosion and sedimentation, and reduces the potential for woody debris within the aquatic system, leading to negative impacts on wildlife.

5.3.4.4 Infrastructure and/or equipment use may result in subtle changes to drainage patterns, adversely affecting vernal pool and wetland hydrology.

7 Natural Systems Modifications

7.2 Dams and Water Management/Use

7.2.5 Abstraction of Ground Water (domestic use)

7.2.5.1 Heavy withdrawal of ground water for domestic use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.6 Abstraction of Ground Water (commercial use)

7.2.6.1 Heavy withdrawal of ground water for industrial and commercial use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.7 Abstraction of Ground Water (agricultural use)

7.2.7.1 Heavy withdrawal of ground water for agricultural use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.3 Other Ecosystem Modifications

7.3.4 Lack of natural disturbance patterns or ecosystem functions due to species loss

7.3.4.4 Human interference in natural processes such as clean up (e.g., beach-filling, shoreline hardening, tree/log removal from forests) after storms, in particular those causing post-hurricane washover and/or barrier island westward movement, and tree felling limits the disturbance needed to maintain appropriate habitats for wildlife.

7.3.4.5 The lack of forest disturbance minimizes the diversity of herbaceous vegetation and other shrubs and trees that need a lot of sunlight to grow.

8 Invasive and Other Problematic Species, Genes and Diseases

8.2 Problematic Native Species/Diseases

8.2.1 Unspecified Species

8.2.1.1 Overabundant native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations

11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

11.2 Droughts

11.2.1 Droughts

11.2.1.1 Contribute to hardened soils, decreasing water recharge during rains and increasing the likelihood of flash floods during storms.

11.2.1.3 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

11.2.1.6 Increased dessication risk for amphibians and altered wetland hydrology for critical habitats including breeding pools.

11.3 Temperature Extremes

11.3.1 Temperature extremes

11.3.1.1 Increasing temperatures may cause habitat loss and degradation by desiccating and/or raising the temperatures of small wetlands and streams leading to the loss of freshwater mussels and other aquatic species and species reliant upon these habitats.

11.3.1.2 Increased temperatures can negatively impact wetland, riverine, lacustrine and vernal pool-associated or -dependent wildlife by reducing flows, increasing water temperatures, lowering water levels and causing premature drying of vernal habitats.

11.4 Storms and Flooding

11.4.1 Storms and flooding

11.4.1.1 Extreme storms and flooding events threaten aquatic and marine wildlife through habitat degradation and alteration, including alterations to off-shore or back-bay benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic and marine wildlife.

11.4.1.3 Increase risk of saltwater intrusion to freshwater habitats altering the water chemistry and potentially altering aquatic wildlife community.

11.4.2 Increased rainfall

11.4.2.1 Extreme rain events threaten aquatic wildlife through habitat degradation and alteration, including alterations to benthic conditions, damage to submerged aquatic vegetation (SAV), increased turbidity, altered water chemistry, and potentially displacement of aquatic wildlife.

11.4.2.3 More frequent rain events can alter terrestrial and wetland vegetation communities as well as wetland hydrology, shifting wildlife community use.

11.5 Sea-level Rise

11.5.0 Sea-level Rise

11.5.0.2 Increased risk of saltwater intrusion into freshwater systems impacting associated wildlife and native vegetation.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory

12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.2 Lack of up-to-date existing information

12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.3 Need to answer research question

12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

2 Direct Management of Natural Resources

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alteration and/or changes in hydrology and subsequent disturbances to and behavioral changes of wildlife (e.g., restoring biologically appropriate buffers, revegetation or restoration efforts, etc.).

2.10.0.19 Provide woody debris within documented Tiger Salamander pools to benefit Tiger Salamanders and other associated vernal pool herpetofauna for shelter, egg-attachment and soil protection.

2.10.0.20 Expand breeding opportunities for obligate vernal pool breeders and related herpetofauna by creating vegetated buffers for dispersal from breeding pools in all directions, or as needed to establish the connectivity of metapopulations.

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

3 Data Collection and Analysis

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.12 Conduct an initial assessment of and document the availability and suitability of intact, preserved forest blocks containing vernal pools within the possible range of Eastern Tiger Salamander, which appear under-represented on a landscape scale. Incorporate findings into a database that includes descriptions and qualifiers of the habitats, and a GIS component of the locations of such areas. Share this information with appropriate organizations and/or agencies working to implement habitat restoration and enhancement strategies to provide opportunities for this salamander to disperse and expand its current range.

3.3.1.13 Conduct wildlife surveys to confirm or reconfirm locations with suitable hydrologic conditions for tiger salamanders and associated vernal pool herpetofauna.

3.3.2 Monitoring

3.3.2.17 Conduct long-term habitat monitoring to determine the continued availability and suitability of intact, preserved forest blocks containing vernal pools within the possible range of Eastern Tiger Salamander. Update the database (to be developed during baseline assessments) regarding the forests' and vernal pools' conditions. Share this information with appropriate organizations and/or agencies working to implement habitat restoration and enhancement strategies to provide opportunities for this salamander to disperse and expand its current range.

3.3.2.18 Conduct long-term monitoring of and wildlife surveys at locations with suitable hydrologic conditions for Eastern Tiger Salamanders and associated vernal pool herpetofauna.

7 Law Enforcement

7.1 Law enforcement

7.1.4 Scale Unspecified

7.1.4.13 Implement policies that protect vernal pool habitats to benefit SGCN that rely upon them and promotes connectivity of SGCN populations.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.13 Develop a plan to minimize agriculture that would result in groundwater withdrawal in critical forested areas.

9.1.0.14 Develop a plan to minimize development that would result in groundwater withdrawal in critical forested areas.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

9.3.3 Habitat management planning

9.3.3.27 Develop a management plan to expand breeding habitat and connectivity for tiger salamanders and other obligate vernal pool breeders.

100 Law and Policy

100.4 State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

Job 11.10. Woody Debris in Aquatic Habitats to Benefit Wildliife

Objective: Maintain natural and woody debris in aquatic habitats by creating legislation, a regulation or NJ DEP policy that prohibits stream cleaning without a proper on-site assessment regarding the likelihood of a flood hazard.

Purpose: Provide focal aquatic SGCN more suitable and varying habitat structure through the presence of coarse woody debris.

Benefits: Improve habitat diversity and complexity and available basking locations, and improve the substrate for macroinvertebrates. Woody debris creates bed scours and pools within streams and increases cover for prey species in all aquatic systems.

Focal wildlife species benefitting from this job

Fish

Alewife	Banded Sunfish	Blackbanded Sunfish
Blueback Herring	Bridle Shiner	Brook Trout
Comely Shiner	Ironcolor Shiner	Mud Sunfish

Swamp Darter

Macroinvertebrates

Brook Floater	Dwarf Wedgemussel	Eastern Lampmussel
Green Floater	New England Bluet	Pine Barrens Bluet
Robust Baskettail	Scarlet Bluet	Septima's Clubtail
Superb Jewelwing	Triangle Floater	Yellow Lampmussel

Reptiles & Amphibians

Eastern Redbelly Turtle	Wood Turtle

Threats and Action Drivers associated with this conservation need

5 Biological Resource Use

5.3 Logging and Wood Harvesting

5.3.3 Unintentional effects (subsistence/small scale)

5.3.3.2 Poorly planned/implemented tree harvesting adjacent to waterways and vernal pools can lead to increased water temperatures, soil erosion and sedimentation, and reduces the potential for woody debris within the aquatic system, leading to negative impacts on wildlife.

5.3.4 Unintentional effects (large scale)

5.3.4.3 Poorly planned/implemented tree harvesting adjacent to waterways and vernal pools can lead to increased water temperatures, soil erosion and sedimentation, and reduces the potential for woody debris within the aquatic system, leading to negative impacts on wildlife.

7 Natural Systems Modifications

7.2 Dams and Water Management/Use

7.2.1 Abstraction of Surface Water (domestic use)

7.2.1.3 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, and eliminates shallow water habitats.

7.2.2 Abstraction of Surface Water (commercial use)

7.2.2.1 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, eliminates shallow water habitats, and disrupts/removes stream bottom habitat.

7.2.3 Abstraction of Surface Water (agricultural use)

7.2.3.2 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, and eliminates shallow water habitats.

7.3 Other Ecosystem Modifications

7.3.3 Removal of coarse woody debris (streams, forests, scrub-shrub habitats)

7.3.3.1 Decreases the available detritus that normally accumulates behind and within stream obstructions, minimizing or eliminating food sources and shelters for fishes, invertebrates and amphibians.

7.3.3.2 Decreases habitat and/or corridor suitability due to limited or absent shelter and foraging habitat.

7.3.3.3 Removal of dead trees (snags), large felled logs (i.e., those > 12" dbh), and other downed woody material diminishes nesting, roosting, and sheltering options for wildlife, and increases the ease at which deer can browse regenerating vegetation.

7.3.3.4 Decreases available basking, shelter, and foraging habitats.

7.3.5 Poor habitat management

7.3.5.9 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, eliminates shallow water habitats, and disrupts/removes stream bottom habitat.

7.3.5.14 Intentional felling and removal of dead standing trees or snags eliminates resting, nesting or feeding habitat, and precludes the snags eventual contribution to coarse woody debris and forest floor structure and habitat.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

100 Law and Policy

100.4 State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.9 Develop and implement policies to minimize the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats in order to benefit wildlife.

100.4.0.22 Work with NJ DEP's Division of Land Use Regulation to ensure protection of listed species and their habitats during stream cleaning events.

Project 12. Habitat Management through Prescribed Burns

Job 12.01. Southern New Jersey Forests - A Tool for Habitat Restoration

Objective: Enable and utilize fire (in combination with other forestry management practices) as a widespread tool for habitat restoration and public safety across 250,000 acres/year, and continue burning on an approximate 5-year cycle.

Purpose: Prevent wildfires from burning out of control while using controlled burns (in combination with other forestry management practices) to increase structural diversity and consequently, the diversity and persistence of forest-dwelling wildlife species.

Benefits: Improve structural diversity within the forest and, consequently, increase/improve suitable wildlife habitats to satisfy the life history requirements of SGCN and increase their survivorship and fecundity to help stabilize or reverse population declines. Additionally, such management can help to improve the forest's resiliency to the threat of pests and climatic changes, increase public safety (Wildland Urban Interface), and protect business investments.

Focal wildlife species benefitting from this job

Birds

American Woodcock	Blue-winged Warbler	Cerulean Warbler
Golden-winged Warbler	Kentucky Warbler	Northern Bobwhite
Prothonotary Warbler	Red-headed Woodpecker	Scarlet Tanager
Wood Thrush		

Macroinvertebrates

A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper
Ashton Cuckoo Bumble Bee	Buchholz's Dart Moth	Buchholz's Gray
Carter's Noctuid Moth	Daecke's Pyralid Moth	Dotted Skipper
Frosted Elfin	Georgia Satyr	Hoary Elfin
Leonard's Skipper	Maritime Sunflower Borer Moth	New Jersey Pine Barrens Tiger Beetle
Pine Barrens Bluet	Pink Sallow	Robust Baskettail
Rusty Patched Bumble Bee	Sand Myrtle Looper/Pink	Scarlet Bluet
Southern Plains Bumble Bee	Variable Cuckoo Bumble Bee	Yellow Bumble Bee
Yellow-banded Bumble Bee		

Mammals

Little Brown Bat	Northern Myotis

Reptiles & Amphibians

Carpenter Frog	Corn Snake	Eastern Box Turtle
Eastern Hognose Snake	Eastern Spadefoot	Eastern Tiger Salamander
New Jersey Chorus Frog	Northern Black Racer	Northern Pine Snake
Northern Scarlet Snake	Pine Barrens Treefrog	Timber Rattlesnake

Threats and Action Drivers associated with this conservation need

7 Natural Systems Modifications

7.1 Fire and Fire Suppression

7.1.2 Suppression of Fire Frequency/Intensity

7.1.2.1 Shift in vegetative communities as a result of suppression of natural fires.

12 Resource Management Needs

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.28 Create incentives to implement dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

2 Direct Management of Natural Resources

2.3 Fire management

2.3.3 Prescribed burning

2.3.3.1 Evaluate different management techniques of prescribed burns that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

2.3.3.2 Conduct prescribed burning in Northern New Jersey forests to maintain and regenerate a mosaic of upland forest habitats.

2.3.3.3 Conduct prescribed burning to improve wildlife habitat.

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.23 Implement appropriate habitat management actions in areas where natural disturbances, such as wildfire, have been precluded.

3 Data Collection and Analysis

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.3 Develop/improve management techniques that might be used to mimic the historic role of fire and other natural disturbances in shaping an ecosystem.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

100 Law and Policy

100.3 State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.70 Develop regulations that when implemented will facilitate the restoration of dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

100.4 State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

Job 12.02. Statewide - A Tool to Restore Natural Disturbance Regimes

Objective: Develop and implement an educational initiative teaching citizens and land managers the benefits (and necessity) of using fire as a management tool in Northern Jersey deciduous forests and the Pinelands' forests to restore healthy ecological systems.

Purpose: Educate citizens and land managers of the benefits and necessity of implementing fire as a habitat management tool to maintain and/or restore ecological systems.

Benefits: Develop support for the use of fire as a management tool to maintain and regenerate mosaic upland forest types in Northern Jersey and the Pinelands with the primary focus on ecological systems rather than public safety.

Focal wildlife species benefitting from this job

Birds

American Woodcock	Blue-winged Warbler	Bobolink
Cerulean Warbler	Eastern Meadowlark	Golden-winged Warbler
Grasshopper Sparrow	Kentucky Warbler	Northern Bobwhite
Northern Harrier	Prothonotary Warbler	Red-headed Woodpecker
Scarlet Tanager	Vesper Sparrow	Wood Thrush

Macroinvertebrates

A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper
Ashton Cuckoo Bumble Bee	Buchholz's Dart Moth	Buchholz's Gray
Carter's Noctuid Moth	Daecke's Pyralid Moth	Dotted Skipper
Frosted Elfin	Georgia Satyr	Hoary Elfin
Leonard's Skipper	Little White Tiger Beetle	Maritime Sunflower Borer Moth
New England Bluet	New Jersey Pine Barrens Tiger Beetle	Northern Metalmark
Papaipema harrisii	Pine Barrens Bluet	Pink Sallow
Robust Baskettail	Rusty Patched Bumble Bee	Sand Myrtle Looper/Pink
Scarlet Bluet	Septima's Clubtail	Southeastern Beach Tiger Beetle
Southern Plains Bumble Bee	Superb Jewelwing	Variable Cuckoo Bumble Bee
Yellow Bumble Bee	Yellow-banded Bumble Bee	

Mammals

Allegheny Woodrat	Indiana Bat	Little Brown Bat
Northern Myotis		

Reptiles & Amphibians

Carpenter Frog	Corn Snake	Eastern Box Turtle
Eastern Hognose Snake	Eastern Spadefoot	Longtail Salamander
New Jersey Chorus Frog	Northern Black Racer	Northern Pine Snake
Northern Red Salamander	Northern Scarlet Snake	Timber Rattlesnake
Wood Turtle		

Threats and Action Drivers associated with this conservation need

14 Education/ Outreach Needs

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions

14.2.1.1 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various forest management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.26 Coordinate across federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to woodland landowners to adopt or endorse consistent best management practices concerning controlled burns to maintain and/or improve forested habitat for wildlife.

8.1.0.44 Engage conservation partners, stakeholders, government agencies and other land stewards in constructive dialogues encouraging their inclusion of controlled burns in forest and other stewardship plans.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

Job 12.03. Prescribed Burn Policy: Revise to include Ecological Enhancement of Private and Conserved Lands

Objective: Revise State policies to extend the prescribed burning season and enable the use of prescribed burns on private and conserved lands for the purpose of ecological diversity and habitat enhancement for wildlife, and to decrease fuel loads.

Purpose: Improve ecological diversity and habitat enhancement for wildlife, and prevent wildfires.

Benefits: Increase opportunities to use fire as a tool to promote ecological diversity, restore fire ecology within the Pinelands, and minimize the risk of wildfires.

Focal wildlife species benefitting from this job

Birds

American Woodcock	Blue-winged Warbler	Bobolink
Cerulean Warbler	Eastern Meadowlark	Golden-winged Warbler
Grasshopper Sparrow	Kentucky Warbler	Northern Bobwhite
Northern Harrier	Prothonotary Warbler	Red-headed Woodpecker
Scarlet Tanager	Vesper Sparrow	Wood Thrush

Macroinvertebrates

A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper
Ashton Cuckoo Bumble Bee	Buchholz's Dart Moth	Buchholz's Gray
Carter's Noctuid Moth	Daecke's Pyralid Moth	Dotted Skipper
Frosted Elfin	Georgia Satyr	Hoary Elfin
Leonard's Skipper	Maritime Sunflower Borer Moth	New England Bluet
New Jersey Pine Barrens Tiger Beetle	Northern Metalmark	Papaipema harrisii

Pine Barrens Bluet	Pink Sallow	Robust Baskettail
Rusty Patched Bumble Bee	Sand Myrtle Looper/Pink	Scarlet Bluet
Septima's Clubtail	Southern Plains Bumble Bee	Variable Cuckoo Bumble Bee
Yellow Bumble Bee	Yellow-banded Bumble Bee	

Mammals

Allegheny Woodrat	Indiana Bat	Little Brown Bat
Northern Myotis		

Reptiles & Amphibians

Carpenter Frog	Corn Snake	Eastern Box Turtle
Eastern Hognose Snake	Eastern Spadefoot	Eastern Tiger Salamander
Longtail Salamander	New Jersey Chorus Frog	Northern Black Racer
Northern Pine Snake	Northern Red Salamander	Northern Scarlet Snake
Pine Barrens Treefrog	Timber Rattlesnake	Wood Turtle

Threats and Action Drivers associated with this conservation need

12 Resource Management Needs

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms

12.3.0.9 Prescribed burns implemented by the NJ Forest Fire Service are constrained by State air quality regulations to a timeframe where seasonal weather conditions are less than ideal for effective burning. As a result, the Forest Fire Service is limited in the number of overall prescribed burns it can implement to restore habitat for wildlife.

12.4.0 State Policy and Procedure Reform

12.4.0.5 Bureau of Forest Fire Management policy has traditionally implemented prescribed burns on State lands for the sole purpose of public safety (i.e., addressing hazard fuel reduction), missing opportunities to burn in a manner that would additionally manage habitat for ecological diversity.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform

12.4.0.5 Bureau of Forest Fire Management policy has traditionally implemented prescribed burns on State lands for the sole purpose of public safety (i.e., addressing hazard fuel reduction), missing opportunities to burn in a manner that would additionally manage habitat for ecological diversity.

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

100 Law and Policy

100.1 Legislation

100.1.4 County and Local

100.1.4.14 Adopt/pass local ordinances which require assessing and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

100.3 State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.45 Increase the controlled burn season to focus on restoring vegetative communities.

100.3.0.70 Develop regulations that when implemented will facilitate the restoration of dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

100.4 State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.17 Develop policies to implement habitat management strategies, including prescribed burns, that will increase the structural diversity on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies to control and reduce the impacts of invasive, non-native species in order to increase structural habitat diversity.

Project 13. Land Management Coordination on Military Properties

Job 13.01. Improving Biodiversity on Military Lands

Objective: Improve the existing military planning mechanism (i.e., the Integrated Natural Resource Management Plan or INRMP) to include best practices for all SGCN (e.g., forest management, minimizing disturbances, appropriate timing of activities, etc.).

Purpose: Improve ecological diversity on military lands by improving management efforts for rare species and their habitats through the implementation of best practices provided through educational programs and materials, positive public relation incentives, and technical assistance to military facility staff regarding the importance of biodiversity and their responsibility for New Jersey's resources.

Benefits: Improve management efforts on military lands to benefit all SGCN by maintaining or restoring suitable habitats to satisfy SGCN's life history requirements and minimizing the risk of harm during management and/or daily activities.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	American Woodcock	Black Rail
Black Skimmer	Blue-winged Warbler	Bobolink
Cerulean Warbler	Common Tern	Eastern Meadowlark
Forster's Tern	Golden-winged Warbler	Grasshopper Sparrow
Kentucky Warbler	Least Tern	Little Blue Heron
Northern Bobwhite	Northern Harrier	Peregrine Falcon
Pied-billed Grebe	Piping Plover	Prothonotary Warbler
Red Knot	Red-headed Woodpecker	Ruddy Turnstone
Scarlet Tanager	Snowy Egret	Tricolored Heron
Vesper Sparrow	Wood Thrush	

Fish

Alewife	Atlantic Sturgeon	Banded Sunfish
Blackbanded Sunfish	Blueback Herring	Bridle Shiner
Brook Trout	Comely Shiner	Ironcolor Shiner
Mud Sunfish	Shortnose Sturgeon	Swamp Darter

Macroinvertebrates

A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper

Ashton Cuckoo Bumble Bee	Brook Floater	Buchholz's Dart Moth
Buchholz's Gray	Carter's Noctuid Moth	Daecke's Pyralid Moth
Dotted Skipper	Dwarf Wedgemussel	Eastern Lampmussel
Frosted Elfin	Georgia Satyr	Green Floater
Hoary Elfin	Leonard's Skipper	Little White Tiger Beetle
Maritime Sunflower Borer Moth	New England Bluet	New Jersey Pine Barrens Tiger Beetle
Northeastern Beach Tiger Beetle	Northern Metalmark	Papaipema harrisii
Pine Barrens Bluet	Pink Sallow	Robust Baskettail
Rusty Patched Bumble Bee	Sand Myrtle Looper/Pink	Scarlet Bluet
Septima's Clubtail	Southeastern Beach Tiger Beetle	Southern Plains Bumble Bee
Superb Jewelwing	Triangle Floater	Variable Cuckoo Bumble Bee
Yellow Bumble Bee	Yellow Lampmussel	Yellow-banded Bumble Bee

Mammals

Allegheny Woodrat	Indiana Bat	Little Brown Bat
Northern Myotis		

Reptiles & Amphibians

Bog Turtle	Carpenter Frog	Corn Snake
Eastern Box Turtle	Eastern Hognose Snake	Eastern Redbelly Turtle
Eastern Spadefoot	Eastern Tiger Salamander	Longtail Salamander
New Jersey Chorus Frog	Northern Black Racer	Northern Diamondback Terrapin
Northern Pine Snake	Northern Red Salamander	Northern Scarlet Snake
Pine Barrens Treefrog	Timber Rattlesnake	Wood Turtle

Threats and Action Drivers associated with this conservation need

5 Biological Resource Use

5.1 Hunting and Collecting Terrestrial Animals

5.1.3 Persecution/Control

5.1.3.1 Wanton killing of perceived dangerous and/or undesirable animals.

5.1.3.2 Improper exclusion methods and/or timing can result in injury, death, or entrapment of bats in buildings.

5.3 Logging and Wood Harvesting

5.3.1 Intentional Use (subsistence/small scale)

5.3.1.1 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may fragment their terrestrial habitats.

5.3.1.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.1.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.1.4 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase the risk of invasive species establishment, impacting SGCN habitats.

5.3.1.5 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may decrease structural diversity and biomass leading to reduced biodiversity and ecological integrity.

5.3.1.6 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices in Atlantic White Cedar stands may destroy a unique wildlife wetland habitat that is difficult, and takes time, to restore.

5.3.3 Unintentional effects (subsistence/small scale)

5.3.3.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.3.2 Poorly planned/implemented tree harvesting adjacent to waterways and vernal pools can lead to increased water temperatures, soil erosion and sedimentation, and reduces the potential for woody debris within the aquatic system, leading to negative impacts on wildlife.

6 Human Intrusions and Disturbance

6.2 Military Exercises

6.2.1 Military exercises

6.2.1.1 Military testing and training exercises may inflict disturbance and potential physical harm to wildlife.

7 Natural Systems Modifications

7.3 Other Ecosystem Modifications

7.3.5 Poor habitat management

7.3.5.5 Habitat management that alters or removes vegetation without implementing long-term management increases the risk of invasive and exotic plants establishing themselves, outcompeting native vegetation.

9 Pollution

9.3 Agricultural and Forestry Effluents

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture

9.3.5.1 Use of pesticides, insecticides, and/or herbicides can directly harm non-target species, such as amphibians and beneficial invertebrates through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5.4 Improper use of current insecticides, such as those containing esfenvalerate, prallethrin, or piperonyl butoxide, or past use of pesticides containing chlordane still present in the soils, are toxic to various wildlife species, and can cause injury, mortality, or other effects that impair population viability.

9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.5 Air-Bourne Pollutants

9.5.4 Other: Other air-bourne pollutants impacting habitat and/or animals.

9.5.4.1 Dust and/or airborne sedimentation from construction sites, agricultural operations or related earth disturbances can introduce mineral or organic sediments into adjacent wildlife habitats, degrading their quality and suitability for wildlife short-term and/or long-term.

9.6 Excess Energy

9.6.2 Thermal Pollution

9.6.2.2 Water temperature changes to aquatic systems can deter or preclude use by SGCN (e.g., alter habitat suitability for wildlife species, reduce prey base) or present stressors that are harmful if not fatal to wildlife.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats

14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions

14.2.1.5 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various wetland management practices.

Conservation actions that address Threats and Action Drivers

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.14 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of herbicides and pesticides, and implementing more ecologically safe strategies when using such products.

1.2.1.28 Create incentives to implement dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

2 Direct Management of Natural Resources

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.13 Implement best management practices (BMPs), protective strategies, and guidelines for vegetation management to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.11.0.16 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

2.11.0.17 Implement vegetation management strategies to improve the availability of prey/food resources for SGCN whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources.

2.11.0.18 Implement forest management/silvicultural strategies that promote the development of new old-growth forests and/or minimize the loss of old-growth forest stands with large trees and within large, contiguous tracts.

2.11.0.19 Implement forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN.

2.11.0.23 Implement appropriate habitat management actions in areas where natural disturbances, such as wildfire, have been precluded.

2.11.0.35 Increase structural habitat diversity by managing vegetation adjacent to aquatic habitats in a manner that provides a buffer from runoff and erosion and a microclimate to stabilize seasonal temperatures to benefit a variety of aquatic and semi-aquatic species.

3 Data Collection and Analysis

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.15 Modify management practices based on the effects of pesticides, herbicides and other biological controls on critical and supporting SGCN habitats.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.2 Develop, implement, monitor and evaluate management strategies to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

3.5.4.14 Develop and implement agreements, and update existing agreements, with government agencies regarding the protection of critical SGCN habitats (e.g., significant breeding populations of beach nesting birds, colonial waterbird nesting areas, bat colonies, etc.).

3.5.4.22 Investigate the efficacy of implementing strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activites.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.13 Engage DOD in a constructive dialogue regarding strategies to minimize disturbances to all SGCN (i.e., beyond their federal requirements) from forest management and other practices on their lands.

8.1.0.43 Engage Nuisance Wildlife Control Operators (NWCOs), conservation partners, and the public in conserving bat populations by advising proper exclusion methods from buildings, offering bat houses where roosting habitat is needed, and improving the public's understanding and acceptance of bats.

8.1.0.50 Engage Nuisance Wildlife Control Operators (NWCOs), conservation partners, and the public in conserving snake populations by advising proper removal from buildings, exclusion methods from buildings, and improving the public's understanding and acceptance of snakes.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.16 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activites and to improve SGCN habitat and presence.

9.3.3 Habitat management planning

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.32 DOD and appropriate state agencies work together to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activites and to improve SGCN habitat and presence.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.7 Review proposed construction or other work projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11.2.0.28 Provide educational resources, training programs, and on-the-ground guidance to Nuisance Wildlife Control Operators (NWCOs) and the public to ensure that proper bat exclusion methods are followed when addressing issues of bats in buildings.

11.2.0.29 Provide educational resources, training programs, and on-the-ground guidance to Nuisance Wildlife Control Operators (NWCOs), conservation partners, and the public in conserving snake populations by advising proper removal from buildings, exclusion methods from buildings, and improving the public's understanding and acceptance of snakes.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.3 Provide educational resources, training programs, and on-the-ground guidance to DOD to improve DOD Integrated Natural Resource Management Plans (INRMP) to develop and implement forest management and other practices that minimize disturbances to SGCN (i.e., beyond their federal requirements).

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

100 Law and Policy

100.3 State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.49 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address the issue of disturbance to habitat or species as a result of human activities (e.g., construction, bridge maintenance, road work, etc.).

Project 14. Fostering Habitat in Urbanized/Suburbanized Areas

Job 14.01. Limit Fragmentation through Creation and Improvement of Urban/Suburban Wildlife Habitat

Objective: Provide transition habitat for birds, reptiles, amphibians, and pollinators by creating edge habitat along the periphery of development and encourage developers to include native grassland and woody vegetation as opposed to "landscaped" areas within stormwater basins.

Purpose: Reduce fragmentation of native habitats by maintaining/creating logical connectivity through appropriate habitat planning and management efforts.

Benefits: Increase and/or improve available wildlife habitat within developed areas to minimize the impacts of habitat fragmentation through native plant landscaping within basins and throughout developments. Create a buffer zone/ecotone between habitats to improve structural diversity and potentially increase foraging habitat for wildlife. Such management would enhance habitat for SGCN and other wildlife.

Focal wildlife species benefitting from this job

Birds

American Woodcock	Blue-winged Warbler	Bobolink
Cerulean Warbler	Eastern Meadowlark	Golden-winged Warbler
Grasshopper Sparrow	Kentucky Warbler	Northern Bobwhite
Northern Harrier	Prothonotary Warbler	Red-headed Woodpecker
Scarlet Tanager	Vesper Sparrow	Wood Thrush

Macroinvertebrates

A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper
Ashton Cuckoo Bumble Bee	Buchholz's Dart Moth	Buchholz's Gray
Carter's Noctuid Moth	Daecke's Pyralid Moth	Dotted Skipper
Frosted Elfin	Georgia Satyr	Hoary Elfin
Leonard's Skipper	Little White Tiger Beetle	Maritime Sunflower Borer Moth
New England Bluet	New Jersey Pine Barrens Tiger Beetle	Northeastern Beach Tiger Beetle
Northern Metalmark	Papaipema harrisii	Pine Barrens Bluet
Pink Sallow	Robust Baskettail	Rusty Patched Bumble Bee
Sand Myrtle Looper/Pink	Scarlet Bluet	Septima's Clubtail
Southeastern Beach Tiger Beetle	Southern Plains Bumble Bee	Superb Jewelwing
Variable Cuckoo Bumble Bee	Yellow Bumble Bee	Yellow-banded Bumble Bee

Mammals

Indiana Bat	Little Brown Bat	Northern Myotis

Reptiles & Amphibians

Bog Turtle	Carpenter Frog	Corn Snake
Eastern Box Turtle	Eastern Hognose Snake	Eastern Spadefoot
Eastern Tiger Salamander	Longtail Salamander	New Jersey Chorus Frog
Northern Black Racer	Northern Pine Snake	Northern Red Salamander
Northern Scarlet Snake	Pine Barrens Treefrog	Timber Rattlesnake
Wood Turtle		

Threats and Action Drivers associated with this conservation need

7 Natural Systems Modifications

7.3 Other Ecosystem Modifications

7.3.5 Poor habitat management

7.3.5.2 Shifting from natural vegetation to lawns can cause increased temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

7.3.5.3 Vegetation clearing removes terrestrial and riparian corridors for animal movement, shelter, and resting areas.

7.3.5.4 Vegetation clearing or inappropriate alteration adjacent to aquatic habitats threatens aquatic species by degrading habitat and water quality (altering temperature and dissolved oxygen, increasing siltation and dessication, etc.).

7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats

14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

Conservation actions that address Threats and Action Drivers

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.8 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to municipalities, land developers, and other land managers to retain and/or enhance native vegetation adjacent to aquatic habitats, and along riparian areas and wildlife movement corridors.

8 Outreach

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.24 Develop educational outreach programs for local decision-makers, land developers, landowners and citizens about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

11 Technical Assistance

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.9 Provide educational resources, training programs, and on-the-ground guidance to municipalities, land developers, and other land managers and private landowners about the importance of leaving vegetation in place, especially along riparian areas and wildlife movement corridors.

11.2.0.22 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers about lawn alternatives and the importance of natural vegetation and "edge" habitats on developed properties.

100 Law and Policy

100.3 State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.73 Develop regulations that would exempt the conversion of lawns to native vegetation (beneficial to wildlife) from local lawn ordinances.

Project 15. Mapping Early Successional Habitats for Planning and Management

Job 15.01. Plan for Development and Agriculture

Objective: Map existing and potential areas (e.g., corporate lawns) for early succession forest habitats to assist long-term landscape-level planning, and habitat creation and management that will address the threats of development and agriculture on early successional species and habitats.

Purpose: Increase and improve early succession forest habitat availability to benefit early successional species.

Benefits: Direct efforts to create and manage early successional habitat for wildlife dependent upon them to help increase survivorship.

Focal wildlife species benefitting from this job

Birds

American Woodcock	Blue-winged Warbler	Bobolink
Cerulean Warbler	Eastern Meadowlark	Golden-winged Warbler
Grasshopper Sparrow	Kentucky Warbler	Northern Bobwhite
Red-headed Woodpecker	Scarlet Tanager	Vesper Sparrow
Wood Thrush		

Macroinvertebrates

A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper
Ashton Cuckoo Bumble Bee	Buchholz's Dart Moth	Buchholz's Gray
Carter's Noctuid Moth	Daecke's Pyralid Moth	Dotted Skipper
Frosted Elfin	Georgia Satyr	Hoary Elfin
Leonard's Skipper	Little White Tiger Beetle	Maritime Sunflower Borer Moth
New Jersey Pine Barrens Tiger Beetle	Northeastern Beach Tiger Beetle	Northern Metalmark
Papaipema harrisii	Pink Sallow	Rusty Patched Bumble Bee
Sand Myrtle Looper/Pink	Scarlet Bluet	Southeastern Beach Tiger Beetle
Southern Plains Bumble Bee	Variable Cuckoo Bumble Bee	Yellow Bumble Bee
Yellow-banded Bumble Bee		

Reptiles & Amphibians

Eastern Box Turtle	Wood Turtle

Threats and Action Drivers associated with this conservation need

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory

12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.2 Lack of up-to-date existing information

12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats

14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

Conservation actions that address Threats and Action Drivers

3 Data Collection and Analysis

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) resident and migratory SGCN habitats. Investigate their suitability for the various life history requirements of the species that dependent upon them to determine the ability for maintaining applicable SGCN populations in perpetuity.

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.7 Map and prioritize existing and potential areas for early succession forest management. Share the results with state, county and municipal planners.

3.3.2 Monitoring

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.17 Engage municipalities in constructive dialogue to identify and minimize destruction of areas prioritized for early succession forest management.

Project 16. Farming for Bobwhite Quail

Job 16.01. Farming for Bobwhite Quail

Objective: Work with farming operations and woodland landowners to decrease clean farming (edge-to-edge) field practices and create ecotones to provide gradual shifts in habitat structure from farm field or grassland to forest.

Purpose: Improve habitat for early successional species, in particular, Northern Bobwhite Quail.

Benefits: Increase Northern Bobwhite Quail habitat, survivorship and fecundity in farmed fields, which will help stabilize or reverse population declines of Northern Bobwhite Quail and other SGCN.

Focal wildlife species benefitting from this job

Birds

American Woodcock	Blue-winged Warbler	Bobolink
Eastern Meadowlark	Grasshopper Sparrow	Northern Bobwhite
Northern Harrier	Red-headed Woodpecker	Vesper Sparrow

Macroinvertebrates

A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper
Ashton Cuckoo Bumble Bee	Buchholz's Dart Moth	Buchholz's Gray
Carter's Noctuid Moth	Daecke's Pyralid Moth	Dotted Skipper
Frosted Elfin	Georgia Satyr	Hoary Elfin
Leonard's Skipper	Maritime Sunflower Borer Moth	New Jersey Pine Barrens Tiger Beetle
Pine Barrens Bluet	Pink Sallow	Robust Baskettail
Rusty Patched Bumble Bee	Sand Myrtle Looper/Pink	Scarlet Bluet
Southern Plains Bumble Bee	Variable Cuckoo Bumble Bee	Yellow Bumble Bee
Yellow-banded Bumble Bee		

Reptiles & Amphibians

Eastern Box Turtle	Wood Turtle

Threats and Action Drivers associated with this conservation need

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.3 Agro-industry

2.1.3.5 Loss of ecotones by implementing clean farming (edge-to-edge) practices degrades habitat for early successional wildlife.

7 Natural Systems Modifications

7.1 Fire and Fire Suppression

7.1.2 Suppression of Fire Frequency/Intensity

7.1.2.1 Shift in vegetative communities as a result of suppression of natural fires.

7.1.2.2 Lack of diversity in age structure and composition of vegetation due to the suppression of fire.

7.3 Other Ecosystem Modifications

7.3.4 Lack of natural disturbance patterns or ecosystem functions due to species loss

7.3.4.5 The lack of forest disturbance minimizes the diversity of herbaceous vegetation and other shrubs and trees that need a lot of sunlight to grow.

7.3.5 Poor habitat management

7.3.5.12 Lack of diversity in age structure and composition of vegetation due to lack of natural disturbances and/or vegetation management.

Conservation actions that address Threats and Action Drivers

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.28 Create incentives to implement dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

1.2.1.28 Create incentives to implement dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

2 Direct Management of Natural Resources

2.3 Fire management

2.3.3 Prescribed burning

2.3.3.3 Conduct prescribed burning to improve wildlife habitat.

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.23 Implement appropriate habitat management actions in areas where natural disturbances, such as wildfire, have been precluded.

11 Technical Assistance

11.2 Technical assistance

11.2.2 With private landowners

11.2.2.1 Provide technical support to farming operations and woodland landowners on ways to decrease clean farming (edge-to-edge) practices and create ecotones to benefit bobwhite and other species dependent on early successional habitat.

Project 17. Habitat Connectivity

Job 17.01. Planning with "Connecting Habitat Across New Jersey (CHANJ)" and Mitigation for Road Impacts

Objective: Use CHANJ products to identify and mitigate the impacts of roads on terrestrial-bound wildlife.

Purpose: Strategic mitigation of the effects of fragmentation and vehicle strikes on terrestrial bound species.

Benefits: Provide safe opportunities for terrestrial-bound to disperse and/or expand their range and increase the persistence and viability of terrestrial-bound species that need to disperse to habitats on the opposing side of the road to fulfill life history requirements.

Focal wildlife species benefitting from this job

Mammals

Allegheny Woodrat

Reptiles & Amphibians

Bog Turtle	Carpenter Frog	Corn Snake
Eastern Box Turtle	Eastern Hognose Snake	Eastern Redbelly Turtle
Eastern Spadefoot	Eastern Tiger Salamander	Longtail Salamander
New Jersey Chorus Frog	Northern Black Racer	Northern Diamondback Terrapin
Northern Pine Snake	Northern Red Salamander	Northern Scarlet Snake
Pine Barrens Treefrog	Timber Rattlesnake	Wood Turtle

Threats and Action Drivers associated with this conservation need

1 **Residential and Commercial Development**

- 1.1 Housing and Urban Areas
  - 1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale)
    - 1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

4 **Transportation and Service Corridors**

- 4.1 Roads and Railroads
  - 4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale)
    - 4.1.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species and inhibiting dispersal of non-volant animals, reducing gene flow.
    - 4.1.1.2 Loss, alteration and/or degradation of habitat associated with road and railroad construction and maintenance, and degradation of adjacent habitats.

4.1.1.3 Re-establishment of abandoned railroad lines may displace wildlife, in particular, less mobile species using the area to fulfill critical life history requirements.

4.1.1.5 Re-establishment of abandoned railroad lines may decrease turtles' abilities to disperse due to their difficulty traversing the railroad ties and tracks, leading to decreased genetic exchange.

4.1.2 Movement of cars and other vehicles on roads and railroads (large and small scale)

4.1.2.1 Increased vehicle traffic increases the risk of wildlife mortality from strikes.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads

4.2.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species, inhibiting dispersal of non-volant animals, reducing gene flow, and creating barriers to fish when service line-associated roads cross streams (e.g., br

4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

7 Natural Systems Modifications

7.2 Dams and Water Management/Use

7.2.12 Culverts

7.2.12.1 Improper design, placement, installation and maintenance of culverts and other stream crossing structures can impede or prevent the movements of terrestrial organisms and can restrict or limit stream flow, impeding the movement of aquatic organisms along

7.3 Other Ecosystem Modifications

7.3.5 Poor habitat management

7.3.5.4 Vegetation clearing or inappropriate alteration adjacent to aquatic habitats threatens aquatic species by degrading habitat and water quality (altering temperature and dissolved oxygen, increasing siltation and dessication, etc.).

7.3.5.7 Improperly planned habitat management and/or mitigation efforts along roadsides and within the medians can attract wildlife and increase the risk of vehicle strikes.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory

12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.2 Lack of up-to-date existing information

12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.2.2 Lack of wildlife monitoring at sites with structures that pose high risk of mortality to SGCN wildlife.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

2 Direct Management of Natural Resources

2.2 Dam and barrier removal

2.2.1 Culvert work

2.2.1.1 Replace existing barriers to wildlife movement with and/or install appropriately-sized systems to accommodate wildlife dispersal.

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.5 Implement biologically safe and appropriate control/management strategies, and where appropriate, eradication strategies to reduce the impacts and/or limit the distribution of invasive and/or non-native plant species within or near aquatic systems using methods that will provide the most protection to the aquatic and riparian ecological system, and minimize disturbance to the soil and wildlife. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.4 Restore and/or enhance suitable travel corridors connecting conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats.

2.10.0.6 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats.

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.3 Create suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats through vegetation management.

3 Data Collection and Analysis

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.6 Develop, implement and conduct studies to evaluate the effectiveness of methods implemented to reduce road mortality of wildlife (e.g. wildlife underpasses, road closures).

3.2.3 Baseline inventory

3.2.3.7 Identify roads or portions of roads, paved or unimproved (through site surveys, land use/land cover assessments and analyses, review of available data, enlistment of species experts, etc.) with high incidences of road mortality and/or presence of snakes, turtles, medium-sized and large mammals. Conduct assessments of the roads and incorporate information into a database that includes descriptions (e.g., qualifiers to help prioritize the roads' risk to wildlife) and a GIS component of the locations of such areas. Share this information with appropriate organizations and/or agencies working to implement measures (e.g., wildlife passages, road closures) to minimize the risk to these species.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size

3.3.1.6 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) that could, through revegetation and/or enhancement efforts, become suitable travel corridors connecting and increasing the effect

3.3.2 Monitoring

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.5 Techniques development

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.9 Conduct studies to evaluate the impacts of roads on SGCN and develop, implement and conduct studies to evaluate the effectiveness of methods to reduce road mortality of wildlife (e.g. wildlife underpasses, road closures).

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

9.1.0.15 Develop a plan to minimize fragmentation of terrestrial and aquatic habitats by roads.

9.1.0.18 Develop a plan to minimize the effects of road widening and traffic volume increases within critical wildlife habitat areas using CHANJ products.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.1.0.23 Develop a plan to mitigate the effects of transportation barriers by using CHANJ products.

9.1.0.27 Develop a plan to use wildlife-appropriate culverts in critical forested areas.

9.1.0.30 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize habitat fragmentation and other related threats associated with development.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

9.3.3 Habitat management planning

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.22 Create management plans to minimize and/or prevent wildlife road mortality that will incorporate wildlife passages in conjunction with barrier fencing and, where possible, seasonal closures. Aquatic-associated passages must avoid disturbance to the natura

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.9 Review strategies for creating or enhancing connectivity (e.g., installing appropriately-sized wildlife passages) between wetlands to allow wildlife to disperse naturally and safely.

11.1.2 Review of proposed policies and plans

11.1.2.4 Review strategies for creating or enhancing connectivity (e.g., installing appropriately-sized wildlife passages) between wetlands to allow wildlife to disperse naturally and safely.

100 Law and Policy

100.3 State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100.4 State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.19 Develop regulations that will minimize the creation of new barriers, remove or replace current barriers with appropriately-sized systems to accommodate wildlife dispersal, and to minimize road widening and traffic volume increases within critical wildlife habitat areas.

Job 17.02. Wildlife Wetland Corridors - Linking Corridors through Acquisition

Objective: Identify optimal wetland corridors for wildlife through GIS modeling at the state, state's landscape regions, and county levels to target priority areas for protection and management.

Purpose: Provide data and guidance to governing agencies, non-profit organizations, and land managers regarding the location and importance of wetlands/wetland corridors critical to and enabling wildlife to disperse for foraging and/or reproduction and improve resiliency to threats (e.g., changes in hydrology, climatic changes, severe weather, development and fragmentation).

Benefits: Help conservation partners identify specific areas for protection and/or management.

Objective: Connect wetlands by acquiring suitable lands to be managed/retained as wildlife corridors through fee title or easement purchase to allow for species' safe dispersal for genetic diversity, to fulfill life history requirements, expand their ranges, and to assist species' resiliency to habitat loss as a result of development, infrastructure, or climate change by providing the opportunity to safely shift their range.

Purpose: Combat the impacts of development, infrastructure, and climate change on wetland-dependent species.

Benefits: Help conservation partners identify specific areas for protection and/or management.

Objective: Connect wetlands by managing lands as wildlife corridors to allow for species' safe dispersal for genetic diversity, to fulfill life history requirements, expand their ranges, and to assist species' resiliency to habitat loss as a result of development, infrastructure, or climate change by providing the opportunity to safely shift their range.

Purpose: Combat the impacts of development, infrastructure, and climate change on wetland-dependent species.

Benefits: Provide opportunities for wetland-dependent and -associate species to expand their range, improve genetic exchange, increase survivorship and fecundity, and to minimize harm associated with threats (e.g., development and infrastructure, changes in hydrology, climatic conditions, etc.).

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	American Woodcock	Black Rail
Black Skimmer	Blue-winged Warbler	Cerulean Warbler
Common Tern	Forster's Tern	Golden-winged Warbler
Kentucky Warbler	Little Blue Heron	Northern Harrier
Pied-billed Grebe	Prothonotary Warbler	Red-headed Woodpecker
Snowy Egret	Tricolored Heron	Wood Thrush

Macroinvertebrates

New England Bluet	Papaipema harrisii	Pine Barrens Bluet
Robust Baskettail	Scarlet Bluet	Septima's Clubtail

Superb Jewelwing

Reptiles & Amphibians

Bog Turtle	Carpenter Frog	Eastern Redbelly Turtle
Eastern Spadefoot	Eastern Tiger Salamander	Longtail Salamander
New Jersey Chorus Frog	Northern Red Salamander	Pine Barrens Treefrog
Timber Rattlesnake	Wood Turtle	

Threats and Action Drivers associated with this conservation need

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale)

1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.1.1.2 Loss, alteration and/or degradation of habitat.

1.1.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.

1.1.1.5 Impervious surfaces can lead to a decrease in water recharge.

1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.1.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale)

1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.2.1.2 Loss, alteration and/or degradation of habitat.

1.2.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.

1.2.1.5 Impervious surfaces can lead to a decrease in water recharge.

1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.2.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale)

1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.3.1.2 Loss, alteration and/or degradation of habitat.

1.3.1.4 Impervious surfaces can lead to a decrease in water recharge.

1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.3.1.6 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale)

4.1.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species and inhibiting dispersal of non-volant animals, reducing gene flow.

4.1.1.3 Re-establishment of abandoned railroad lines may displace wildlife, in particular, less mobile species using the area to fulfill critical life history requirements.

4.1.1.5 Re-establishment of abandoned railroad lines may decrease turtles' abilities to disperse due to their difficulty traversing the railroad ties and tracks, leading to decreased genetic exchange.

4.1.2 Movement of cars and other vehicles on roads and railroads (large and small scale)

4.1.2.1 Increased vehicle traffic increases the risk of wildlife mortality from strikes.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads

4.2.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species, inhibiting dispersal of non-volant animals, reducing gene flow, and creating barriers to fish when service line-associated roads cross streams (e.g., bridges, culverts, fords, etc).

4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

4.2.2 Management of rights-of-way or communication tower facilities and/or their associated access roads

4.2.2.1 Improper or poorly scheduled vegetation management can cause direct mortality to and may reduce productivity of wildlife.

11 Climate Change and Severe Weather

11.1 Habitat Shifting or Alteration

11.1.0 Macro- and Micro-Climate Alterations

11.1.0.1 Alters native terrestrial and aquatic habitats at the macro- and micro-climate levels that can affect suitability for wildlife, in particular specialist species.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory

12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.2 Lack of up-to-date existing information

12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2 Direct Management of Natural Resources

2.2 Dam and barrier removal

2.2.1 Culvert work

2.2.1.1 Replace existing barriers to wildlife movement with and/or install appropriately-sized systems to accommodate wildlife dispersal.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.4 Restore and/or enhance suitable travel corridors connecting conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats.

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.3 Create suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN by restoring unsuitable (or less optimal) habitats through vegetation management.

2.11.0.13 Implement best management practices (BMPs), protective strategies, and guidelines for vegetation management to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.11.0.26 Conduct vegetation management along roadsides and medians, avoiding peak activity periods for wildlife, that enhances wildlife dispersal naturally and safely across roads and similar barriers to/between terrestrial and/or aquatic habitats.

3 Data Collection and Analysis

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.4 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and investigate the suitability of corridors that connect large, contiguous tracts of similar habitats to increase their effective size (i.e., forest with forest, grassland with grassland, wetlands with wetlands, etc.) for dependent SGCN.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.1 Enhance and increase the effective size of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates by securing adjacent habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.3 Secure and protect riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.5 Secure and protect critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.18 Engage NJDOT, NJ Transit Authority and other road management entities, wildlife conservation organizations/agencies (e.g., Division of Fish and Wildlife, New Jersey Conservation Foundation, Conserve Wildlife Foundation of NJ), and communities and citizens in discussions regarding the importance of and methods to enhance habitat connectivity, and work together to develop feasible strategies for ensuring that wildlife can disperse naturally and safely across roads and similar barriers to terrestrial and/or aquatic habitats.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and the SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.1.0.3 Develop a plan that directs the creation of impervious surfaces away from and to minimize impacts on aquatic systems and critical terrestrial habitats. The plan should also include strategies to increase the resiliency of aquatic and critical terrestrial habitats to threats and stressors that would impact the reproduction and survival of wildlife.

9.1.0.19 Develop a plan to minimize the extent of impervious surfaces as part of new construction to increase water recharge in those areas.

9.1.0.22 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

9.3.3 Habitat management planning

9.3.3.22 Create management plans to minimize and/or prevent wildlife road mortality that will incorporate wildlife passages in conjunction with barrier fencing and, where possible, seasonal closures. Aquatic-associated passages must avoid disturbance to the natural streambeds and riparian habitat, permit high volumes of water to flow freely, and provide adequate travel corridors for terrestrial wildlife, while maintaining stream flow for fish passage. Bridges that span rivers and streambeds and include floodplain habitat on either side of the span to provide travel corridors for terrestrial wildlife are preferred over culverts.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.2 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.1.5 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

11.1.1.9 Review strategies for creating or enhancing connectivity (e.g., installing appropriately-sized wildlife passages) between wetlands to allow wildlife to disperse naturally and safely.

11.1.2 Review of proposed policies and plans

11.1.2.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimize human-associated disturbances to those habitats and the SGCN inhabiting them.

11.1.2.4 Review strategies for creating or enhancing connectivity (e.g., installing appropriately-sized wildlife passages) between wetlands to allow wildlife to disperse naturally and safely.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.1 Provide technical support to private and public landowners and land managers for carrying out restoration and management practices aimed at increasing structural habitat diversity.

11.2.0.24 Provide educational resources, training programs, and expert guidance to public and private landowners and land managers on how to manage vegetated roadside areas (e.g., mowing, brush-hogging, etc.) on a schedule that avoids peak activity periods for wildlife and therefore, minimizes harm.

100 Law and Policy

100.1 Legislation

100.1.5 Scale Unspecified

100.1.5.4 Incorporate habitat connectivity and preservation of natural areas into state and local land-use policy and the environmental review process to minimize the impacts of transportation and service corridors on fish and wildlife and their habitats.

100.4 State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.16 Develop policies to implement habitat management strategies that will increase the structural diversity surrounding areas used for energy, mining, and transportation and service corridors which include but are not limited to the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides.

Project 18. Invasive and Non-native Species Control

Job 18.01. Protect Natural Areas from Invasive Species

Objective: Identify and protect high quality habitats from non-native and/or invasive plant and wildlife species' invasions.

Purpose: Protect intact habitats with the highest biodiversity and heritage components in perpetuity.

Benefits: Conserve the best remaining examples of New Jersey's biodiversity and natural heritage.

Focal wildlife species benefitting from this job

Birds

American Woodcock	Black Rail	Blue-winged Warbler
Bobolink	Cerulean Warbler	Common Tern
Eastern Meadowlark	Forster's Tern	Golden-winged Warbler
Grasshopper Sparrow	Kentucky Warbler	Little Blue Heron
Northern Bobwhite	Northern Harrier	Peregrine Falcon
Pied-billed Grebe	Prothonotary Warbler	Red-headed Woodpecker
Scarlet Tanager	Snowy Egret	Tricolored Heron
Vesper Sparrow	Wood Thrush	

Fish

Alewife	Atlantic Sturgeon	Banded Sunfish
Blackbanded Sunfish	Blueback Herring	Bridle Shiner
Brook Trout	Comely Shiner	Ironcolor Shiner
Mud Sunfish	Shortnose Sturgeon	Swamp Darter

Macroinvertebrates

A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper
Ashton Cuckoo Bumble Bee	Brook Floater	Buchholz's Dart Moth
Buchholz's Gray	Carter's Noctuid Moth	Daecke's Pyralid Moth
Dotted Skipper	Dwarf Wedgemussel	Eastern Lampmussel
Frosted Elfin	Georgia Satyr	Green Floater
Hoary Elfin	Leonard's Skipper	Little White Tiger Beetle
Maritime Sunflower Borer Moth	New England Bluet	New Jersey Pine Barrens Tiger Beetle

Northeastern Beach Tiger Beetle	Northern Metalmark	Papaipema harrisii
Pine Barrens Bluet	Pink Sallow	Robust Baskettail
Rusty Patched Bumble Bee	Sand Myrtle Looper/Pink	Scarlet Bluet
Septima's Clubtail	Southeastern Beach Tiger Beetle	Southern Plains Bumble Bee
Superb Jewelwing	Triangle Floater	Variable Cuckoo Bumble Bee
Yellow Bumble Bee	Yellow Lampmussel	Yellow-banded Bumble Bee

Mammals

Allegheny Woodrat

Reptiles & Amphibians

Bog Turtle	Carpenter Frog	Corn Snake
Eastern Box Turtle	Eastern Hognose Snake	Eastern Redbelly Turtle
Eastern Spadefoot	Eastern Tiger Salamander	Longtail Salamander
New Jersey Chorus Frog	Northern Black Racer	Northern Pine Snake
Northern Red Salamander	Northern Scarlet Snake	Pine Barrens Treefrog
Timber Rattlesnake	Wood Turtle	

Threats and Action Drivers associated with this conservation need

6 Human Intrusions and Disturbance

6.3 Work and Other Activities

6.3.1 Unauthorized research projects at significant habitats

6.3.1.4 Illegal transfer of freshwater fish from one waterbody/watershed to another can result in the spread of non-native, invasive and/or undesirable fish or mussel species and/or diseases.

6.3.1.5 Illegal transfer of freshwater mussels from one waterbody/watershed to another can result in the spread of non-native, invasive and/or undesirable mussel species and/or diseases.

6.3.2 Authorized research projects at significant habitats

6.3.2.5 Authorized transfer of freshwater fish from one waterbody/watershed to another can result in the spread of non-native, invasive and/or undesirable fish or mussel species and/or diseases.

6.3.2.6 Authorized transfer of freshwater mussels from one waterbody/watershed to another can result in the spread of non-native, invasive and/or undesirable mussel species and/or diseases.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species

8.1.1.1 Displace or outcompete native species for resources.

8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.

8.1.1.3 Invasive, non-native insects can damage native vegetation at a large scale, leading to die-offs, altering the ecological community.

8.1.1.4 Invasive, non-native animals increase the risk of predation on native animals and/or herbivory on native vegetation.

8.1.1.5 Invasive, non-native animals and plants increase the risk of introduction and transference of diseases.

8.1.1.6 Invasive, non-native plants may create physical barriers for some species.

8.1.2 Invasive non-native aquatic animals

8.1.2.2 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminishing habitat suitability and reducing ecological integrity of natural communities, and may introduce disease into a population.

8.1.3 Invasive non-native aquatic plants

8.1.3.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.4 Invasive non-native terrestrial/wetland animals

8.1.4.1 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.5 Invasive non-native terrestrial/wetland plants

8.1.5.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.2 Problematic Native Species/Diseases

8.2.1 Unspecified Species

8.2.1.3 Invasive, native species can out-compete non-invasive species for resources (food, light, shelter), leading to the demise of some species populations.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory

12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.2 Lack of up-to-date existing information

12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

2 Direct Management of Natural Resources

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.1 Control invasive insect infestations by implementing BMP strategies through biological, chemical and/or mechanical means that will depress, or when appropriate, eradicate populations in a manner that avoids excessive harm to non-target species using BMPs to control infestations and limit their spread based on an inventory of invasive insect distribution and response to outbreaks.

2.8.0.2 Develop, implement, monitor and evaluate pest control/management strategies to reduce the impacts of over-abundant wildlife species (native and/or native, invasive species) on native vegetation and the degradation of habitats supporting SGCN. Over-abundant wildlife species include but are not limited to mute swans, Canada geese, beaver and white-tailed deer.

2.8.0.3 Work with NJ Invasive Species Strike Team to identify areas with and eradicate aquatic invasive species such as the Asian Swamp Eel, Northern Snakehead, and the Chinese pond mussel. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.6 Implement long-term management of invasive and/or non-native plants to help maintain functioning ecological systems and biological diversity, and to enhance travel corridors. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.14 Wildlife disease management

2.14.0 Wildlife disease strategy development and investigation

2.14.0.3 Protect SGCN from non-native pathogen introduction or incident through implementation of a "rapid response plan"; DFW to give priority attention to these species in planning and/or implementing a response.

3 Data Collection and Analysis

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.2 Monitoring

3.3.2.20 Once a system is developed for reporting and qualifying new locations of invasive species, develop, implement and monitor/evaluate invasive species removal strategies at identified locations. Priority should be given to those areas critical to SGCN and/or contain unique and/or rare plant communities supporting SGCN and/or other fish/wildlife species.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

Job 18.02. Invasive Species Elimination and Reduction - Aquatic Wildlife

Objective: Identify areas where harmful, invasive aquatic wildlife threaten native wildlife and the community, and implement BMP strategies to control, and when appropriate, eliminate the invasive species.

Purpose: Restore aquatic habitats to healthy, functioning systems that benefit the native wildlife dependent upon them.

Benefits: Eliminate invasive species such as Chinese Pond mussels, snakeheads, and flathead catfish to benefit native wildlife populations.

Focal wildlife species benefitting from this job

Fish

Alewife	Atlantic Sturgeon	Banded Sunfish
Blackbanded Sunfish	Blueback Herring	Bridle Shiner
Brook Trout	Comely Shiner	Ironcolor Shiner
Mud Sunfish	Shortnose Sturgeon	Swamp Darter

Macroinvertebrates

Brook Floater	Dwarf Wedgemussel	Eastern Lampmussel
Green Floater	Triangle Floater	Yellow Lampmussel

Threats and Action Drivers associated with this conservation need

6 Human Intrusions and Disturbance

6.3 Work and Other Activities

6.3.1 Unauthorized research projects at significant habitats

6.3.1.4 Illegal transfer of freshwater fish from one waterbody/watershed to another can result in the spread of non-native, invasive and/or undesirable fish or mussel species and/or diseases.

6.3.1.5 Illegal transfer of freshwater mussels from one waterbody/watershed to another can result in the spread of non-native, invasive and/or undesirable mussel species and/or diseases.

6.3.2 Authorized research projects at significant habitats

6.3.2.5 Authorized transfer of freshwater fish from one waterbody/watershed to another can result in the spread of non-native, invasive and/or undesirable fish or mussel species and/or diseases.

6.3.2.6 Authorized transfer of freshwater mussels from one waterbody/watershed to another can result in the spread of non-native, invasive and/or undesirable mussel species and/or diseases.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.2 Invasive non-native aquatic animals

8.1.2.2 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminishing habitat suitability and reducing ecological integrity of natural communities, and may introduce disease into a population.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory

12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.2 Lack of up-to-date existing information

12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

2 Direct Management of Natural Resources

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.3 Work with NJ Invasive Species Strike Team to identify areas with and eradicate aquatic invasive species such as the Asian Swamp Eel, Northern Snakehead, and the Chinese pond mussel. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.14 Identify areas with invasive, aquatic plants and animals and collect a detailed baseline assessment of the species' status and distribution. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort. Researchers and contractors performing Forest Stewardship Inventories and/or Plans on state lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.0.0.15 Conduct long-term monitoring of areas identified as having invasive, aquatic plants and animals to track the species' status/progress over time with or without the implementation of management strategies. Areas without management strategies should be assessed and prioritized for management/control. Areas where management strategies are being implemented should include an assessment of the management effort and identify/recommend and implement necessary changes to improve its success. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.8 Implement and conduct long-term monitoring of control measures aimed at minimizing the impacts of problematic species and/or diseases to evaluate the effectiveness of such efforts and to identify and incorporate additional strategies as appropriate.

3.2.0.9 Maintain an inventory of invasive insect distribution and where they exist, conduct long-term monitoring of habitat conditions to assist in developing strategies to combat the impacts to SGCN habitats. Report potential infestations to NJ DEP.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

Job 18.03. Implement Multiple Strategies to Reduce the Spread of Invasive and Non-native Plants

Objective: Reduce the introduction and spread of invasive and non-native plants through a variety of management strategies.

Purpose: Control the spread of invasive and non-native plants to improve ecosystem health and biodiversity.

Benefits: Protect SGCN and restore and maintain the native habitats on which they depend.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	American Woodcock	Black Rail
Black Skimmer	Blue-winged Warbler	Bobolink
Cerulean Warbler	Common Tern	Eastern Meadowlark
Forster's Tern	Golden-winged Warbler	Grasshopper Sparrow
Kentucky Warbler	Least Tern	Little Blue Heron
Northern Bobwhite	Northern Harrier	Peregrine Falcon
Pied-billed Grebe	Piping Plover	Prothonotary Warbler
Red-headed Woodpecker	Scarlet Tanager	Snowy Egret
Tricolored Heron	Vesper Sparrow	Wood Thrush

Fish

Alewife	Banded Sunfish	Blackbanded Sunfish
Blueback Herring	Bridle Shiner	Brook Trout
Comely Shiner	Ironcolor Shiner	Mud Sunfish
Shortnose Sturgeon	Swamp Darter	

Macroinvertebrates

A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper
Ashton Cuckoo Bumble Bee	Brook Floater	Buchholz's Dart Moth
Buchholz's Gray	Carter's Noctuid Moth	Daecke's Pyralid Moth

Dotted Skipper	Dwarf Wedgemussel	Eastern Lampmussel
Frosted Elfin	Georgia Satyr	Green Floater
Hoary Elfin	Leonard's Skipper	Little White Tiger Beetle
Maritime Sunflower Borer Moth	New England Bluet	New Jersey Pine Barrens Tiger Beetle
Northeastern Beach Tiger Beetle	Northern Metalmark	Papaipema harrisii
Pine Barrens Bluet	Pink Sallow	Robust Baskettail
Rusty Patched Bumble Bee	Sand Myrtle Looper/Pink	Scarlet Bluet
Septima's Clubtail	Southeastern Beach Tiger Beetle	Southern Plains Bumble Bee
Superb Jewelwing	Triangle Floater	Variable Cuckoo Bumble Bee
Yellow Bumble Bee	Yellow Lampmussel	Yellow-banded Bumble Bee
Mammals		
Allegheny Woodrat	Indiana Bat	Little Brown Bat
Northern Myotis		
Reptiles & Amphibians		
Atlantic Green Turtle	Bog Turtle	Carpenter Frog
Corn Snake	Eastern Hognose Snake	Eastern Redbelly Turtle
Eastern Spadefoot	Eastern Tiger Salamander	Longtail Salamander
New Jersey Chorus Frog	Northern Black Racer	Northern Diamondback Terrapin
Northern Pine Snake	Northern Red Salamander	Northern Scarlet Snake
Pine Barrens Treefrog	Timber Rattlesnake	Wood Turtle

Threats and Action Drivers associated with this conservation need

6 Human Intrusions and Disturbance

6.3 Work and Other Activities

6.3.1 Unauthorized research projects at significant habitats

6.3.1.4 Illegal transfer of freshwater fish from one waterbody/watershed to another can result in the spread of non-native, invasive and/or undesirable fish or mussel species and/or diseases.

6.3.1.5 Illegal transfer of freshwater mussels from one waterbody/watershed to another can result in the spread of non-native, invasive and/or undesirable mussel species and/or diseases.

6.3.2 Authorized research projects at significant habitats

6.3.2.5 Authorized transfer of freshwater fish from one waterbody/watershed to another can result in the spread of non-native, invasive and/or undesirable fish or mussel species and/or diseases.

6.3.2.6 Authorized transfer of freshwater mussels from one waterbody/watershed to another can result in the spread of non-native, invasive and/or undesirable mussel species and/or diseases.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species

8.1.1.1 Displace or outcompete native species for resources.

8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.

8.1.1.5 Invasive, non-native animals and plants increase the risk of introduction and transference of diseases.

8.1.1.6 Invasive, non-native plants may create physical barriers for some species.

8.1.3 Invasive non-native aquatic plants

8.1.3.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

8.1.5 Invasive non-native terrestrial/wetland plants

8.1.5.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.16 Create incentives (non-monetary and/or monetary) within State regulations (mitigations requirements or credit, BMP satisfaction, etc.) to promote the use of retailers who refrain from selling specified invasive or other problematic plant species.

1.2.1.17 Develop a public-relations oriented certification program for private retailers who refrain from selling specified invasive or other problematic plant species.

2 Direct Management of Natural Resources

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.3 Work with NJ Invasive Species Strike Team to identify areas with and eradicate aquatic invasive species such as the Asian Swamp Eel, Northern Snakehead, and the Chinese pond mussel. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.6 Implement long-term management of invasive and/or non-native plants to help maintain functioning ecological systems and biological diversity, and to enhance travel corridors. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

8 Outreach

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.25 Develop educational outreach programs for landowners, nurseries and the general public regarding the negative impacts of invasive and non-native plants on our natural communities.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

100 Law and Policy

100.1 Legislation

100.1.5 Scale Unspecified

100.1.5.5 Develop legislation to provide financial support for the New Jersey Invasive Species Strike Team.

100.3 State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.

100.4 State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.24 Develop policies to provide financial support for the New Jersey Invasive Species Strike Team.

Job 18.04. Forest Restoration through Invasive Plant Species Control

Objective: Restore breeding and migratory forest habitat for birds and invertebrates through invasive plant species suppression.

Purpose: Improve habitat conditions for breeding and migratory SGCN, particularly for birds and invertebrates.

Benefits: Improve and restore habitat, habitat connectivity, and water quality, while improving the aesthetics of the forest and reducing the presence of pests.

Focal wildlife species benefitting from this job

Birds

American Woodcock	Blue-winged Warbler	Cerulean Warbler
Golden-winged Warbler	Kentucky Warbler	Northern Bobwhite
Northern Harrier	Prothonotary Warbler	Scarlet Tanager
Wood Thrush		

Macroinvertebrates

A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper

Ashton Cuckoo Bumble Bee	Buchholz's Dart Moth	Buchholz's Gray
Carter's Noctuid Moth	Daecke's Pyralid Moth	Dotted Skipper
Frosted Elfin	Georgia Satyr	Hoary Elfin
Leonard's Skipper	Maritime Sunflower Borer Moth	New England Bluet
New Jersey Pine Barrens Tiger Beetle	Northern Metalmark	Papaipema harrisii
Pine Barrens Bluet	Pink Sallow	Robust Baskettail
Rusty Patched Bumble Bee	Sand Myrtle Looper/Pink	Scarlet Bluet
Septima's Clubtail	Southern Plains Bumble Bee	Superb Jewelwing
Variable Cuckoo Bumble Bee	Yellow Bumble Bee	Yellow-banded Bumble Bee

Threats and Action Drivers associated with this conservation need

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species

8.1.1.1 Displace or outcompete native species for resources.

8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.

8.1.1.6 Invasive, non-native plants may create physical barriers for some species.

8.1.5 Invasive non-native terrestrial/wetland plants

8.1.5.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

2 Direct Management of Natural Resources

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.10 Planting/seeding

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.21 Restore and/or enhance understory habitats that suppress invasive species and provide critical resources and enhance sheltering, foraging, and nesting cover for animals and invertebrates.

2.10.0.22 Restore and/or enhance terrestrial and aquatic habitats to promote the regeneration of native vegetation and enhance structural diversity to benefit SGCN (e.g., vegetative buffers of aquatic systems, allow coarse, woody debris to remain in terrestrial, aquatic and riparian habitats to provide shelter, riparian stabilization and necessary microclimates, plant native trees, shrubs and grasses, etc.).

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.19 Implement forest management/silviculture strategies that enhance and maintain critical core forests as appropriate for targeted species (e.g., for many SGCN forest birds, "core" forest would include the forest area >90 meters from the forest edge), in perpetuity, to benefit interior forest and disturbance-sensitive SGCN.

2.11.0.43 Manage forests to increase variation in age structure and composition using BMPs that promote and maintain functioning ecological forest-based systems and biological diversity.

2.11.0.45 Regularly and/or rotationally create young forest habitat in targeted areas to maintain and regenerate a mosaic of upland forest habitats that will benefit shrub- and young forest-dependent species.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

Job 18.05. Control of Phragmites to Increase Marsh Bird Nesting Habitat

Objective: Increase the availability of suitable nesting habitat for marsh bird SGCN by reducing, if not eliminating, the presence of Phragmites monocultures.

Purpose: Increase suitable habitat available for successful nesting of marsh birds.

Benefits: Increase areas available for successful nesting of marsh birds.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	Black Rail	Black Skimmer
Common Tern	Forster's Tern	Least Tern
Little Blue Heron	Northern Harrier	Piping Plover
Snowy Egret	Tricolored Heron	

Threats and Action Drivers associated with this conservation need

7 Natural Systems Modifications

7.3 Other Ecosystem Modifications

7.3.5 Poor habitat management

7.3.5.16 Lack of proactive management to preserve or maintain viable and functioning marshes for SGCN wildlife.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.5 Invasive non-native terrestrial/wetland plants

8.1.5.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory

12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.2 Lack of up-to-date existing information

12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

2 Direct Management of Natural Resources

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.30 Identify and prioritize areas where various management tools (such as increasing salinity through the management of water levels or chemical applications) may be effective in reducing phragmites within and restoring marsh habitat.

2.11.0.44 Manage phragmites adjacent to coastal marshes of interest, in particular those that are within underdeveloped areas and are unprotected, through herbicide application and water management to improve resiliency of the marshes to sea level rise.

3 Data Collection and Analysis

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.22 Identify, assess and prioritize marsh habitats for restoration where various management tools (such as increasing salinity through the management of water levels or chemical applications) may be effective in reducing the presence of phragmites.

3.3.2 Monitoring

3.3.2.21 Develop, implement and evaluate the effectiveness of management strategies use to restore marsh habitat (e.g., phragmites reduction).

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

Job 18.06. Control Invasive, Non-native Plant Species within Wetlands and Wetland Buffers

Objective: Improve the quality of wetland habitats by suppressing and/or eradicating invasive, non-native plant species threatening wetland habitats and wetland-dependent wildlife through long-term, active management and monitoring. Prioritize treatment areas by selecting important SGCN inhabited wetlands with known invasive plant infestations.

Purpose: Restore wetland habitats to healthy, functioning systems that benefit the wildlife dependent upon them.

Benefits: Improve the quality of the wetland habitat for wildlife SGCN.

Focal wildlife species benefitting from this job

Birds

Black Rail	Common Tern	Forster's Tern
Little Blue Heron	Northern Harrier	Pied-billed Grebe
Red Knot	Ruddy Turnstone	Snowy Egret
Tricolored Heron		

Reptiles & Amphibians

Bog Turtle	Carpenter Frog	Eastern Box Turtle
Eastern Redbelly Turtle	Eastern Spadefoot	Eastern Tiger Salamander
Longtail Salamander	New Jersey Chorus Frog	Northern Red Salamander
Pine Barrens Treefrog	Timber Rattlesnake	Wood Turtle

Threats and Action Drivers associated with this conservation need

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.1 Unspecified Species

8.1.1.1 Displace or outcompete native species for resources.

8.1.1.2 Alters, degrades and/or reduces the structural diversity of the natural composition of the landscape, including aquatic systems.

8.1.1.4 Invasive, non-native animals increase the risk of predation on native animals and/or herbivory on native vegetation.

8.1.1.6 Invasive, non-native plants may create physical barriers for some species.

8.2 Problematic Native Species/Diseases

8.2.1 Unspecified Species

8.2.1.3 Invasive, native species can out-compete non-invasive species for resources (food, light, shelter), leading to the demise of some species populations.

8.2.2 Named Species

8.2.2.2 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory

12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.2 Lack of up-to-date existing information

12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

2 Direct Management of Natural Resources

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

3 Data Collection and Analysis

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.20 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of habitat management and/or species experts, etc.) where invasive, non-indigenous plants and animals are either already established or are becoming established. Create a system for reporting and qualifying new locations of invasive species and for prioritizing areas for control measures according to the potential level of impact on the ecosystem and SGCN and the likelihood of success. Researchers and contractors encountering invasive plant species while performing plant and/or forest inventories on state or other conserved lands and/or private lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.3.2 Monitoring

3.3.2.20 Once a system is developed for reporting and qualifying new locations of invasive species, develop, implement and monitor/evaluate invasive species removal strategies at identified locations. Priority should be given to those areas critical to SGCN and/or contain unique and/or rare plant communities supporting SGCN and/or other fish/wildlife species.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

Project 19. Invasive and Native Species Control

Job 19.01. Deer Management: A Tool for Habitat Restoration

Objective: Increase the available access for hunting within high deer density areas to reduce herds and their impacts on the regeneration and competitive ability of native tree and shrub species.

Purpose: Minimize the impacts of deer browse on native forests and restoration projects, such as forest regeneration and Atlantic White Cedar restoration.

Benefits: Increase the regeneration of native tree and shrub species, thereby maintaining the availability of natural habitats and improve their resiliency to climatic changes.

Focal wildlife species benefitting from this job

Birds

American Woodcock	Blue-winged Warbler	Cerulean Warbler
Golden-winged Warbler	Kentucky Warbler	Northern Bobwhite
Northern Harrier	Prothonotary Warbler	Red-headed Woodpecker
Scarlet Tanager	Wood Thrush	

Macroinvertebrates

A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper
Ashton Cuckoo Bumble Bee	Buchholz's Dart Moth	Buchholz's Gray
Carter's Noctuid Moth	Daecke's Pyralid Moth	Dotted Skipper
Frosted Elfin	Georgia Satyr	Hoary Elfin
Leonard's Skipper	Maritime Sunflower Borer Moth	New England Bluet
New Jersey Pine Barrens Tiger Beetle	Northern Metalmark	Papaipema harrisii
Pine Barrens Bluet	Pink Sallow	Robust Baskettail
Rusty Patched Bumble Bee	Sand Myrtle Looper/Pink	Scarlet Bluet
Septima's Clubtail	Southern Plains Bumble Bee	Superb Jewelwing
Variable Cuckoo Bumble Bee	Yellow Bumble Bee	Yellow-banded Bumble Bee

Mammals

Indiana Bat	Little Brown Bat	Northern Myotis

Reptiles & Amphibians

Carpenter Frog	Corn Snake	Eastern Box Turtle

Eastern Hognose Snake	Eastern Redbelly Turtle	Eastern Spadefoot
Eastern Tiger Salamander	Longtail Salamander	New Jersey Chorus Frog
Northern Black Racer	Northern Pine Snake	Northern Red Salamander
Northern Scarlet Snake	Pine Barrens Treefrog	Timber Rattlesnake
Wood Turtle		

Threats and Action Drivers associated with this conservation need

8 Invasive and Other Problematic Species, Genes and Diseases

8.2 Problematic Native Species/Diseases

8.2.2 Named Species

8.2.2.2 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

Conservation actions that address Threats and Action Drivers

2 Direct Management of Natural Resources

2.13 Wildlife damage management

2.13.0 Nuisance fish and wildlife damage

2.13.0.7 Develop, implement, monitor and evaluate management strategies to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

Job 19.02. Long-term Monitoring Program for Submerged Aquatic Vegetation Distribution

Objective: Establish a long-term monitoring program for submerged aquatic vegetation through the incorporation of a budgetary line item designated to consistently fund monitoring stations throughout Barnegat Bay, Little Egg Harbor Bay, and Great Bay.

Purpose: Provide the necessary framework and funds to gather consistent, useful data over time to determine trends in changes to the vegetative species, distribution, density, etc.

Benefits: Obtain essential monitoring data that can be used to more appropriately direct other research and conservation efforts (e.g., decreases in essential fish habitat, spawning grounds, overall fish population declines, etc.).

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	Black Skimmer	Least Tern
Piping Plover	Red Knot	Ruddy Turnstone

Fish

Alewife	Atlantic Sturgeon	Blueback Herring
Shortnose Sturgeon		

Mammals

North Atlantic Right Whale

Reptiles & Amphibians

Atlantic Green Turtle	Atlantic Leatherback	Atlantic Loggerhead
Atlantic Ridley	Northern Diamondback Terrapin	

Threats and Action Drivers associated with this conservation need

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory

12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.3 Inadequate or outdated submerged aquatic vegetation mapping inhibits effective regulatory protection, despite having appropriate rules in place.

12.1.2 Lack of up-to-date existing information

12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

3 Data Collection and Analysis

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.30 Using available data, model a comprehensive Marine Submerged Aquatic Vegetation Mapping project (similar to the Statewide freshwater wetlands mapping project) of sufficient quality and integrity that it could support the NJ DEP's coastal regulatory programs. Continue to conduct surveys to gather additional data to test and improve the model.

3.3.2 Monitoring

3.3.2.23 Conduct long-term monitoring of marine submerged aquatic vegetation and update the Marine Submerged Aquatic Vegetation Mapping [to be developed under baseline activities] to provide the NJ DEP's coastal regulatory programs with the most current data.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.5 Engage government agencies, conservation partners and other stakeholders in discussions focused on establishing a long-term monitoring program for submerged aquatic vegetation distribution throughout Barnegat, Little Egg Harbor and Great Bay.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

100 Law and Policy

100.1 Legislation

100.1.3 Sub-national Level

100.1.3.4 Initiate legislative action to establish an annual budgetary line item designating funds to support programs and monitoring stations throughout Barnegat, Little Egg Harbor and Great Bay focused on long-term monitoring of submerged aquatic vegetation, both native and exotic species.

100.4 State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.5 Create a policy that requires an initial and subsequent updates of a comprehensive marine submerged aquatic vegetation mapping for use by NJ DEP's coastal regulatory program.

Job 19.03. Eelgrass Protection through Boat Propeller Damage Prevention

Objective: Prevent damage to Eelgrass (submerged aquatic vegetation) beds by educating boaters on the impacts of boat scarring and blowouts.

Purpose: Preserve submerged aquatic habitat.

Benefits: Maintain fish spawning habitat and provide shelter from predators, improve shoreline stabilization, reduce nutrient loading and sediment movement, thereby reducing risks to wildlife.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	Black Rail	Black Skimmer
Common Tern	Forster's Tern	Least Tern
Little Blue Heron	Piping Plover	Red Knot
Ruddy Turnstone	Snowy Egret	Tricolored Heron

Fish

Alewife	Atlantic Sturgeon	Blueback Herring
Shortnose Sturgeon		

Mammals

North Atlantic Right Whale

Reptiles & Amphibians

Atlantic Green Turtle	Atlantic Leatherback	Atlantic Loggerhead
Atlantic Ridley	Northern Diamondback Terrapin	

Threats and Action Drivers associated with this conservation need

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats

14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions

14.2.1.2 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various aquatic and riparian management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.7 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting coastal boating and recreation communities about eelgrass/widgeongrass, their impacts on marine environments, and the value, fragility and location of submerged aquatic vegetation beds and habitats.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.18 Develop an Eelgrass/Widgeon Grass education and mapping program to educate coastal boating and recreation communities about the value, fragility and location of submerged aquatic vegetation beds and habitats.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

Project 20. Incentives to Encourage Wildlife Conservation Efforts

Job 20.01. Incentives for Private Lands Management

Objective: Encourage and provide support for land owners to implement SGCN-focused habitat management by creating incentives for guidance and technical assistance for customized management plans for targeted SGCN, and cost-sharing for on-the-ground management.

Purpose: Increase the acreage of lands where SGCN-focused habitat management efforts are implemented, in particular, habitat corridors, wetlands and vernal pools.

Benefits: Recruit landowners as conservation partners and enable them to be part of a larger program with a stake in long term land and habitat conservation; increase SGCN-suitable habitat acreage on private lands; increase SGCN populations.

Focal wildlife species benefitting from this job

Birds

American Woodcock	Black Rail	Blue-winged Warbler
Bobolink	Cerulean Warbler	Eastern Meadowlark
Golden-winged Warbler	Grasshopper Sparrow	Kentucky Warbler
Northern Bobwhite	Prothonotary Warbler	Red-headed Woodpecker
Scarlet Tanager	Vesper Sparrow	Wood Thrush

Macroinvertebrates

A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper
Ashton Cuckoo Bumble Bee	Brook Floater	Buchholz's Dart Moth
Buchholz's Gray	Carter's Noctuid Moth	Daecke's Pyralid Moth
Dotted Skipper	Dwarf Wedgemussel	Eastern Lampmussel
Frosted Elfin	Georgia Satyr	Green Floater
Hoary Elfin	Leonard's Skipper	Maritime Sunflower Borer Moth
New England Bluet	New Jersey Pine Barrens Tiger Beetle	Northern Metalmark
Papaipema harrisii	Pine Barrens Bluet	Pink Sallow
Robust Baskettail	Rusty Patched Bumble Bee	Sand Myrtle Looper/Pink
Scarlet Bluet	Septima's Clubtail	Southern Plains Bumble Bee
Superb Jewelwing	Triangle Floater	Variable Cuckoo Bumble Bee
Yellow Bumble Bee	Yellow Lampmussel	Yellow-banded Bumble Bee

Mammals

Allegheny Woodrat	Indiana Bat	Little Brown Bat
Northern Myotis		

Reptiles & Amphibians

Bog Turtle	Carpenter Frog	Corn Snake
Eastern Box Turtle	Eastern Hognose Snake	Eastern Redbelly Turtle
Eastern Spadefoot	Eastern Tiger Salamander	Longtail Salamander
New Jersey Chorus Frog	Northern Black Racer	Northern Pine Snake
Northern Red Salamander	Northern Scarlet Snake	Pine Barrens Treefrog
Timber Rattlesnake	Wood Turtle	

Threats and Action Drivers associated with this conservation need

7 Natural Systems Modifications

7.3 Other Ecosystem Modifications

7.3.5 Poor habitat management

7.3.5.1 Improper or poorly scheduled maintenance of man-made corridors (e.g., roadsides and medians) can cause direct mortality to and may reduce productivity of wildlife.

7.3.5.2 Shifting from natural vegetation to lawns can cause increased temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

7.3.5.3 Vegetation clearing removes terrestrial and riparian corridors for animal movement, shelter, and resting areas.

7.3.5.4 Vegetation clearing or inappropriate alteration adjacent to aquatic habitats threatens aquatic species by degrading habitat and water quality (altering temperature and dissolved oxygen, increasing siltation and dessication, etc.).

7.3.5.5 Habitat management that alters or removes vegetation without implementing long-term management increases the risk of invasive and exotic plants establishing themselves, outcompeting native vegetation.

7.3.5.6 Habitat management, including that which occurs on public and private lands, that does not consider timing and species' behaviors can result in the direct mortality and/or alteration or loss of habitat.

Conservation actions that address Threats and Action Drivers

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.2 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to increase the effective size of SGCN habitats by protecting/restoring adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats.

1.2.1.9 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing Forestry Stewardship Programs.

1.2.1.21 Create and/or support market-based programs that subsidize or create branding for products derived sustainably from managed wildlife habitats.

1.2.1.23 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to private and public landowners and land managers to provide cost shares and/or plan approvals for management based on management approaches and prescriptions.

1.2.1.28 Create incentives to implement dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.26 Coordinate across federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to woodland landowners to adopt or endorse consistent best management practices concerning controlled burns to maintain and/or improve forested habitat for wildlife.

8.1.0.38 Engage partners, stakeholders and land managers in constructive dialogue promoting forest stewardship for SGCN that use core forests and forested corridors.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.26 Develop educational outreach programs for private and public landowners and land managers regarding the importance of and how to manage core forests and forested corridors in a way that will be beneficial for SGCN, particularly endangered, threatened and special concern species.

11 Technical Assistance

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.10 Provide technical support to private landowners, consultants, and land managers to create customized management plans based on location and SGCN.

100 Law and Policy

100.3 State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.32 Coordinate regulations across agencies to maximize availability of and enrollment in existing Forestry Stewardship Programs (e.g., "Woodland Stewards", Farm Bill, partners, etc.) to maintain and/or improve forest habitat.

Job 20.02. Backyard Habitat Incentive

Objective: Provide training and resources to schools and private/public landowners to create native habitats for SGCN (e.g., green ribbon schools, green schools, influence municipal ordinances) and presentations, seminars, and conferences to residents and government agencies to influence policy change with creation and passage of a habitat bill, and encourage local and backyard habitat improvements.

Purpose: Reduce SGCN habitat loss and fragmentation and encourage policies that provide incentives to those implementing such positive management and restoration efforts.

Benefits: Improve habitat with native vegetation for local ecosystem benefits, including backyards and small-areas where suitable habitat is limiting; engage citizens in habitat conservation.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	American Woodcock	Black Rail
Black Skimmer	Blue-winged Warbler	Bobolink
Cerulean Warbler	Common Tern	Eastern Meadowlark
Forster's Tern	Golden-winged Warbler	Grasshopper Sparrow
Kentucky Warbler	Least Tern	Little Blue Heron
Northern Bobwhite	Pied-billed Grebe	Piping Plover
Prothonotary Warbler	Red-headed Woodpecker	Scarlet Tanager
Snowy Egret	Tricolored Heron	Vesper Sparrow
Wood Thrush		

Fish

Alewife	Atlantic Sturgeon	Banded Sunfish
Blackbanded Sunfish	Blueback Herring	Bridle Shiner
Brook Trout	Comely Shiner	Ironcolor Shiner

Mud Sunfish	Shortnose Sturgeon	Swamp Darter
Macroinvertebrates		
A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper
Ashton Cuckoo Bumble Bee	Brook Floater	Buchholz's Dart Moth
Buchholz's Gray	Carter's Noctuid Moth	Daecke's Pyralid Moth
Dotted Skipper	Dwarf Wedgemussel	Eastern Lampmussel
Frosted Elfin	Georgia Satyr	Green Floater
Hoary Elfin	Leonard's Skipper	Little White Tiger Beetle
Maritime Sunflower Borer Moth	New England Bluet	New Jersey Pine Barrens Tiger Beetle
Northeastern Beach Tiger Beetle	Northern Metalmark	Papaipema harrisii
Pine Barrens Bluet	Pink Sallow	Robust Baskettail
Rusty Patched Bumble Bee	Sand Myrtle Looper/Pink	Scarlet Bluet
Septima's Clubtail	Southeastern Beach Tiger Beetle	Southern Plains Bumble Bee
Superb Jewelwing	Triangle Floater	Variable Cuckoo Bumble Bee
Yellow Bumble Bee	Yellow Lampmussel	Yellow-banded Bumble Bee
Mammals		
Allegheny Woodrat	Indiana Bat	Little Brown Bat
Northern Myotis		
Reptiles & Amphibians		
Bog Turtle	Carpenter Frog	Corn Snake
Eastern Box Turtle	Eastern Hognose Snake	Eastern Redbelly Turtle
Eastern Spadefoot	Eastern Tiger Salamander	Longtail Salamander
New Jersey Chorus Frog	Northern Black Racer	Northern Diamondback Terrapin
Northern Pine Snake	Northern Red Salamander	Northern Scarlet Snake
Pine Barrens Treefrog	Timber Rattlesnake	Wood Turtle

Threats and Action Drivers associated with this conservation need

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats

14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

Conservation actions that address Threats and Action Drivers

4 Education

4.1 Educator/Instructor training

4.1.0 Public education

4.1.0.1 Provide educational resources and training programs to private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.4 Engage government agencies, conservation partners and other stakeholders in constructive dialogues encouraging them to influence policy change and the creation of incentives through a habitat bill and/or municipal ordinances for backyard habitat.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.30 Develop educational outreach programs for private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

100 Law and Policy

100.3 State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.73 Develop regulations that would exempt the conversion of lawns to native vegetation (beneficial to wildlife) from local lawn ordinances.

Job 20.03. Incentives for Corporations and Transportation Authorities

Objective: Provide non-monetary incentives (e.g., fast-tracked permits, public relations recognition, mitigation credits, etc.) to pipeline and utility companies, transportation services (roads and railroads), and renewable energy companies for integrating conservation measures in their project plans to 1) reduce direct and indirect wildlife mortality, 2) minimize habitat fragmentation, 3) create new habitat where appropriate, and 4) implement such efforts within a reasonable time period.

Purpose: Minimize direct and indirect impacts from energy and transportation development on terrestrial-bound wildlife and invertebrates, as well as their habitats (forests, young forest/scrub-shrub, wetlands, and grasslands).

Benefits: Improve habitat condition and reduce future fragmentation of habitats while improving wildlife travel corridors, leading to reductions in wildlife mortality and improved and population size.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	American Woodcock	Black Rail
Black Skimmer	Blue-winged Warbler	Bobolink
Cerulean Warbler	Common Tern	Eastern Meadowlark
Forster's Tern	Golden-winged Warbler	Grasshopper Sparrow
Kentucky Warbler	Least Tern	Little Blue Heron
Northern Bobwhite	Northern Harrier	Peregrine Falcon
Pied-billed Grebe	Piping Plover	Prothonotary Warbler
Red Knot	Red-headed Woodpecker	Ruddy Turnstone
Scarlet Tanager	Snowy Egret	Tricolored Heron
Vesper Sparrow	Wood Thrush	

Fish

Alewife	Atlantic Sturgeon	Banded Sunfish
Blackbanded Sunfish	Blueback Herring	Bridle Shiner
Brook Trout	Comely Shiner	Ironcolor Shiner
Mud Sunfish	Shortnose Sturgeon	Swamp Darter

Macroinvertebrates

A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper
Ashton Cuckoo Bumble Bee	Brook Floater	Buchholz's Dart Moth
Buchholz's Gray	Carter's Noctuid Moth	Daecke's Pyralid Moth
Dotted Skipper	Dwarf Wedgemussel	Eastern Lampmussel

Frosted Elfin	Georgia Satyr	Green Floater
Hoary Elfin	Leonard's Skipper	Little White Tiger Beetle
Maritime Sunflower Borer Moth	New England Bluet	New Jersey Pine Barrens Tiger Beetle
Northeastern Beach Tiger Beetle	Northern Metalmark	Papaipema harrisii
Pine Barrens Bluet	Pink Sallow	Robust Baskettail
Rusty Patched Bumble Bee	Sand Myrtle Looper/Pink	Scarlet Bluet
Septima's Clubtail	Southeastern Beach Tiger Beetle	Southern Plains Bumble Bee
Superb Jewelwing	Triangle Floater	Variable Cuckoo Bumble Bee
Yellow Bumble Bee	Yellow Lampmussel	Yellow-banded Bumble Bee
Mammals		
Allegheny Woodrat	Indiana Bat	Little Brown Bat
Northern Myotis		
Reptiles & Amphibians		
Bog Turtle	Carpenter Frog	Corn Snake
Eastern Box Turtle	Eastern Hognose Snake	Eastern Redbelly Turtle
Eastern Spadefoot	Eastern Tiger Salamander	Longtail Salamander
New Jersey Chorus Frog	Northern Black Racer	Northern Diamondback Terrapin
Northern Pine Snake	Northern Red Salamander	Northern Scarlet Snake
Pine Barrens Treefrog	Timber Rattlesnake	Wood Turtle

Threats and Action Drivers associated with this conservation need

12 Resource Management Needs

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform

12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

100 Law and Policy

100.3 State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.73 Develop regulations that would exempt the conversion of lawns to native vegetation (beneficial to wildlife) from local lawn ordinances.

Job 20.04. Incentives for Developers to Integrate SGCN Habitats into Planning

Objective: Provide the means to encourage or enhance incorporation of SGCN needs into development planning to protect pockets of habitats, increase restoration of habitats affected by new development, and retain or enhance wildlife corridors for safe passage.

Purpose: Provide food, habitat, and habitat connections for SGCN in newly developed areas.

Benefits: Reduce habitat loss, maintain connectivity of habitats, and improve protection for riparian corridors.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	American Woodcock	Black Rail
Black Skimmer	Blue-winged Warbler	Bobolink
Cerulean Warbler	Common Tern	Eastern Meadowlark
Forster's Tern	Golden-winged Warbler	Grasshopper Sparrow
Kentucky Warbler	Least Tern	Little Blue Heron
Northern Bobwhite	Northern Harrier	Peregrine Falcon
Pied-billed Grebe	Piping Plover	Prothonotary Warbler
Red Knot	Red-headed Woodpecker	Ruddy Turnstone
Scarlet Tanager	Snowy Egret	Tricolored Heron
Vesper Sparrow	Wood Thrush	

Fish

Alewife	Atlantic Sturgeon	Banded Sunfish
Blackbanded Sunfish	Blueback Herring	Bridle Shiner
Brook Trout	Comely Shiner	Ironcolor Shiner
Mud Sunfish	Shortnose Sturgeon	Swamp Darter

Macroinvertebrates

A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper
Ashton Cuckoo Bumble Bee	Brook Floater	Buchholz's Dart Moth
Buchholz's Gray	Carter's Noctuid Moth	Daecke's Pyralid Moth

Dotted Skipper	Dwarf Wedgemussel	Eastern Lampmussel
Frosted Elfin	Georgia Satyr	Green Floater
Hoary Elfin	Leonard's Skipper	Little White Tiger Beetle
Maritime Sunflower Borer Moth	New England Bluet	New Jersey Pine Barrens Tiger Beetle
Northeastern Beach Tiger Beetle	Northern Metalmark	Papaipema harrisii
Pine Barrens Bluet	Pink Sallow	Robust Baskettail
Rusty Patched Bumble Bee	Sand Myrtle Looper/Pink	Scarlet Bluet
Septima's Clubtail	Southeastern Beach Tiger Beetle	Southern Plains Bumble Bee
Superb Jewelwing	Triangle Floater	Variable Cuckoo Bumble Bee
Yellow Bumble Bee	Yellow Lampmussel	Yellow-banded Bumble Bee
Mammals		
Allegheny Woodrat	Indiana Bat	Little Brown Bat
Northern Myotis		
Reptiles & Amphibians		
Bog Turtle	Carpenter Frog	Corn Snake
Eastern Box Turtle	Eastern Hognose Snake	Eastern Redbelly Turtle
Eastern Spadefoot	Eastern Tiger Salamander	Longtail Salamander
New Jersey Chorus Frog	Northern Black Racer	Northern Diamondback Terrapin
Northern Pine Snake	Northern Red Salamander	Northern Scarlet Snake
Pine Barrens Treefrog	Timber Rattlesnake	Wood Turtle

Threats and Action Drivers associated with this conservation need

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale)

1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.1.1.2 Loss, alteration and/or degradation of habitat.

1.1.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.

1.1.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale)

1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.2.1.2 Loss, alteration and/or degradation of habitat.

1.2.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.

1.2.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.

1.2.1.5 Impervious surfaces can lead to a decrease in water recharge.

1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale)

1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.3.1.2 Loss, alteration and/or degradation of habitat.

1.3.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

Conservation actions that address Threats and Action Drivers

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.11 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to public and private landowners and managers, including but not limited to government and non-government agencies/organizations, energy, mining, and transportation and utility service companies/agencies, to minimize commercial infrastructure and impervious surfaces, and to improve wildlife habitats, limit fragmentation, reduce elements which would exacerbate mortality, and/or implement activities/restoration that would create new or improved corridor habitat and/or increase connectivity, and to increase structural habitat diversity through the implementation of a variety of vegetation management practices that also considers appropriate timing for such activities to avoid sensitive periods (e.g., nesting, denning, roosting), and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

1.2.1.13 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to land developers to minimize the impacts of new residential and commercial developments on SGCN and their habitats.

100 Law and Policy

100.3 State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.73 Develop regulations that would exempt the conversion of lawns to native vegetation (beneficial to wildlife) from local lawn ordinances.

Job 20.05. Incentives for Working Land Habitat

Objective: Encourage and provide support for owners of "working lands" (commercial farms and forests) to enroll in land management programs by funding existing incentive programs, developing new market-based incentive programs, and funding other existing programs that are currently under-funded or not funded (e.g., Landowner Incentive Program).

Purpose: Increase the acreage of land where SGCN-focused habitat management is implemented in grasslands and forests, thereby reducing mortality and increasing populations.

Benefits: Funded incentive programs increase adoption and implementation of habitat projects on private land; financial incentives resulting from market-based programs provide a mechanism for proactive habitat management beyond the typical 3 year cycle of incentive programs.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	American Woodcock	Black Rail
Black Skimmer	Blue-winged Warbler	Bobolink
Cerulean Warbler	Common Tern	Eastern Meadowlark

Forster's Tern	Golden-winged Warbler	Grasshopper Sparrow
Kentucky Warbler	Little Blue Heron	Northern Bobwhite
Northern Harrier	Pied-billed Grebe	Prothonotary Warbler
Red Knot	Red-headed Woodpecker	Scarlet Tanager
Snowy Egret	Tricolored Heron	Vesper Sparrow
Wood Thrush		

Fish

Alewife	Banded Sunfish	Blackbanded Sunfish
Blueback Herring	Bridle Shiner	Brook Trout
Comely Shiner	Ironcolor Shiner	Mud Sunfish
Swamp Darter		

Macroinvertebrates

A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper
Ashton Cuckoo Bumble Bee	Brook Floater	Buchholz's Dart Moth
Buchholz's Gray	Carter's Noctuid Moth	Daecke's Pyralid Moth
Dotted Skipper	Dwarf Wedgemussel	Eastern Lampmussel
Frosted Elfin	Georgia Satyr	Green Floater
Hoary Elfin	Leonard's Skipper	Maritime Sunflower Borer Moth
New England Bluet	New Jersey Pine Barrens Tiger Beetle	Northern Metalmark
Papaipema harrisii	Pine Barrens Bluet	Pink Sallow
Robust Baskettail	Rusty Patched Bumble Bee	Sand Myrtle Looper/Pink
Scarlet Bluet	Septima's Clubtail	Southern Plains Bumble Bee
Superb Jewelwing	Triangle Floater	Variable Cuckoo Bumble Bee
Yellow Bumble Bee	Yellow Lampmussel	Yellow-banded Bumble Bee

Mammals

Indiana Bat	Little Brown Bat	Northern Myotis

Reptiles & Amphibians

Bog Turtle	Carpenter Frog	Corn Snake
Eastern Box Turtle	Eastern Hognose Snake	Eastern Redbelly Turtle
Eastern Spadefoot	Eastern Tiger Salamander	Longtail Salamander

New Jersey Chorus Frog	Northern Black Racer	Northern Diamondback Terrapin
Northern Pine Snake	Northern Red Salamander	Northern Scarlet Snake
Pine Barrens Treefrog	Timber Rattlesnake	Wood Turtle

Threats and Action Drivers associated with this conservation need

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture

2.1.1.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.1.2 Conversion, and subsequent loss, of high salt marsh to low salt marsh threatens high-marsh dependent species and those dependent on the marsh-upland ecotone.

2.1.2 Small-holder Farming

2.1.2.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.2.2 Fragments terrestrial and aquatic habitats.

2.1.2.3 Agricultural practices (e.g., mechanized, row-crop agriculture) can render lands unsuitable for most wildlife due to soil degradation and erosion and can cause direct mortality to wildlife when harvesting takes places.

2.1.3 Agro-industry

2.1.3.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.3.2 Fragments terrestrial and aquatic habitats.

2.1.3.3 Agricultural practices (e.g., mechanized, row-crop agriculture) can render lands unsuitable for most wildlife due to soil degradation and erosion and can cause direct mortality to wildlife when harvesting takes places.

2.2 Wood and Pulp Plantations

2.2.1 Small Holder

2.2.1.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.2.2 Agro-industry Plantations

2.2.2.1 Conversion of native forests to plantations decreases the habitat quality for forest-dependent species.

2.3 Livestock Farming and Ranching

2.3.2 Small-holder Grazing

2.3.2.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.2.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

2.3.3 Agro-industry Grazing

2.3.3.1 Inappropriately located, newly created horse/livestock farms may fragment forest habitats.

2.3.3.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

2.3.3.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.3.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

2.4 Marine and Freshwater Aquaculture

2.4.1 Subsistence/Artisinal Aquaculture

2.4.1.1 May degrade freshwater and intertidal habitat due to farming techniques and damage from associated structures.

2.4.1.3 Potential for increased nutrient and effluent loads.

2.4.2 Industrial Aquaculture

2.4.2.1 May degrade freshwater and intertidal habitat due to farming techniques and damage from associated structures.

2.4.2.3 Potential for increased nutrient and effluent loads.

7 Natural Systems Modifications

7.3 Other Ecosystem Modifications

7.3.5 Poor habitat management

7.3.5.1 Improper or poorly scheduled maintenance of man-made corridors (e.g., roadsides and medians) can cause direct mortality to and may reduce productivity of wildlife.

7.3.5.2 Shifting from natural vegetation to lawns can cause increased temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

7.3.5.3 Vegetation clearing removes terrestrial and riparian corridors for animal movement, shelter, and resting areas.

7.3.5.4 Vegetation clearing or inappropriate alteration adjacent to aquatic habitats threatens aquatic species by degrading habitat and water quality (altering temperature and dissolved oxygen, increasing siltation and dessication, etc.).

7.3.5.5 Habitat management that alters or removes vegetation without implementing long-term management increases the risk of invasive and exotic plants establishing themselves, outcompeting native vegetation.

7.3.5.6 Habitat management, including that which occurs on public and private lands, that does not consider timing and species' behaviors can result in the direct mortality and/or alteration or loss of habitat.

7.3.5.7 Improperly planned habitat management and/or mitigation efforts along roadsides and within the medians can attract wildlife and increase the risk of vehicle strikes.

7.3.5.12 Lack of diversity in age structure and composition of vegetation due to lack of natural disturbances and/or vegetation management.

7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

Conservation actions that address Threats and Action Drivers

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.10 Coordinate across government agencies and non-government organizations to maximize the availability of and enrollment in existing landowner incentive programs (e.g., "farm bill," partners, etc.) to maintain and/or improve habitat.

1.2.1.19 Create incentives for federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to farmers, woodland landowners, and private landowners to adopt and/or endorse consistent BMPs concerning controlled burns to maintain and/or improve wildlife habitat.

1.2.1.20 Coordinate across government agencies and non-government organizations to create or expand upon tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMP's.

1.2.1.21 Create and/or support market-based programs that subsidize or create branding for products derived sustainably from managed wildlife habitats.

1.2.1.26 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing landowner incentive programs.

1.2.1.28 Create incentives to implement dynamic forest disturbance patterns, using tools such as fire, flooding, and silviculture, to support the full life cycle requirements of forest and early successional wildlife species.

Project 21. Tax Structure for Conservation

Job 21.01. This Job is currently under development.

Objective:

Purpose:

Benefits:

Focal wildlife species benefitting from this job

Threats and Action Drivers associated with this conservation need

Conservation actions that address Threats and Action Drivers

Project 22. Habitat Protection

Job 22.01. Easements and Acquisition

Objective: Continue to preserve key Focal SGCN habitats from the threat of development and high intensity agriculture through land acquisition and easements, in particular for grasslands, meadows, and wetlands, which are under conditions of reduced funding of incentive programs.

Purpose: Ensure grassland birds and pollinators, and wetland dependent species retain key habitats.

Benefits: Improve resiliency of SGCN populations and increase gene flow.

Focal wildlife species benefitting from this job

Birds

Black Rail	Bobolink	Common Tern
Eastern Meadowlark	Forster's Tern	Grasshopper Sparrow
Little Blue Heron	Northern Harrier	Snowy Egret
Tricolored Heron	Vesper Sparrow	Wood Thrush

Macroinvertebrates

A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper
Ashton Cuckoo Bumble Bee	Brook Floater	Buchholz's Dart Moth
Buchholz's Gray	Carter's Noctuid Moth	Daecke's Pyralid Moth
Dotted Skipper	Dwarf Wedgemussel	Eastern Lampmussel
Frosted Elfin	Georgia Satyr	Green Floater
Hoary Elfin	Leonard's Skipper	Maritime Sunflower Borer Moth
New England Bluet	New Jersey Pine Barrens Tiger Beetle	Northern Metalmark
Papaipema harrisii	Pine Barrens Bluet	Pink Sallow
Robust Baskettail	Rusty Patched Bumble Bee	Sand Myrtle Looper/Pink
Scarlet Bluet	Septima's Clubtail	Southern Plains Bumble Bee
Superb Jewelwing	Triangle Floater	Variable Cuckoo Bumble Bee
Yellow Bumble Bee	Yellow Lampmussel	Yellow-banded Bumble Bee

Reptiles & Amphibians

Bog Turtle	Carpenter Frog	Eastern Box Turtle
Eastern Redbelly Turtle	Eastern Spadefoot	Eastern Tiger Salamander

Longtail Salamander	New Jersey Chorus Frog	Northern Red Salamander
Pine Barrens Treefrog	Timber Rattlesnake	Wood Turtle

Threats and Action Drivers associated with this conservation need

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale)

1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.1.1.2 Loss, alteration and/or degradation of habitat.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale)

1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.2.1.2 Loss, alteration and/or degradation of habitat.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale)

1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.3.1.2 Loss, alteration and/or degradation of habitat.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture

2.1.1.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.2 Small-holder Farming

2.1.2.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.2.2 Fragments terrestrial and aquatic habitats.

2.1.2.3 Agricultural practices (e.g., mechanized, row-crop agriculture) can render lands unsuitable for most wildlife due to soil degradation and erosion and can cause direct mortality to wildlife when harvesting takes places.

2.1.3 Agro-industry

2.1.3.1 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades habitat, especially for early-successional species.

2.1.3.2 Fragments terrestrial and aquatic habitats.

2.1.3.3 Agricultural practices (e.g., mechanized, row-crop agriculture) can render lands unsuitable for most wildlife due to soil degradation and erosion and can cause direct mortality to wildlife when harvesting takes places.

2.3 Livestock Farming and Ranching

2.3.2 Small-holder Grazing

2.3.2.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

2.3.2.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.2.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

2.3.3 Agro-industry Grazing

2.3.3.2 Overgrazing of pasturelands and/or hay-fields degrade suitability for wildlife.

2.3.3.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.3.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

12 Resource Management Needs

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms

12.3.0.6 Certain geographic or habitat features, such as vernal pools and headwater wetlands or streams, may be too small, mischaracterized, or misidentified to benefit from regulatory protection.

Conservation actions that address Threats and Action Drivers

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.1 Enhance and increase the effective size of critical migratory stopover habitats for songbirds, raptors, shorebirds, bats and invertebrates by securing adjacent habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.2 Enhance and increase the effective size of SGCN habitats by protecting adjacent habitats that contribute to the overall size of the "core" area and/or provide a natural buffer, enhancing the suitability of the core area for SGCN, and/or connect conserved SGCN habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.3 Secure and protect riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.4 Secure and protect fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.3 Increase the protection of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through conservation area designations

Job 22.02. Forest Stewardship Program

Objective: Provide a means of forest land preservation similar to current farmland preservation through legislation that also gives the rights to conduct tree harvests through State-approved forest management or forest stewardship plans.

Purpose: Long-term protection and management of forest habitats to benefit forest- and young forest-dwelling species.

Benefits: Enable more private landowners to conduct forest management on behalf of forest- and young forest-dependent SGCN.

Focal wildlife species benefitting from this job

Birds

American Woodcock	Blue-winged Warbler	Cerulean Warbler
Golden-winged Warbler	Kentucky Warbler	Northern Bobwhite
Prothonotary Warbler	Red-headed Woodpecker	Scarlet Tanager
Wood Thrush		

Macroinvertebrates

A Notodontid Moth (H. varia)	Arogos Skipper	Buchholz's Dart Moth
Buchholz's Gray	Carter's Noctuid Moth	Daecke's Pyralid Moth
Dotted Skipper	Frosted Elfin	Georgia Satyr
Hoary Elfin	Leonard's Skipper	Little White Tiger Beetle
Maritime Sunflower Borer Moth	New Jersey Pine Barrens Tiger Beetle	Northeastern Beach Tiger Beetle

Northern Metalmark	Papaipema harrisii	Pink Sallow
Sand Myrtle Looper/Pink	Southeastern Beach Tiger Beetle	

Mammals

Allegheny Woodrat	Indiana Bat	Little Brown Bat
Northern Myotis		

Reptiles & Amphibians

Carpenter Frog	Eastern Box Turtle	Eastern Hognose Snake
Eastern Spadefoot	Eastern Tiger Salamander	Longtail Salamander
New Jersey Chorus Frog	Northern Black Racer	Northern Pine Snake
Northern Red Salamander	Northern Scarlet Snake	Pine Barrens Treefrog
Timber Rattlesnake	Wood Turtle	

Threats and Action Drivers associated with this conservation need

12 Resource Management Needs

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform

12.4.0.7 Land preservation contracts, easements, etc. that do not contain prescriptive language or flexibility allowing for habitat management can result in unsuitable habitat conditions and biodiversity declines for SGCN.

Conservation actions that address Threats and Action Drivers

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.9 Develop a new funding source, targeting natural resource damages monies, mitigation monies or other available sources, to fund new or existing Forestry Stewardship Programs.

1.2.1.19 Create incentives for federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to farmers, woodland landowners, and private landowners to adopt and/or endorse consistent BMPs concerning controlled burns to maintain and/or improve wildlife habitat.

1.2.1.21 Create and/or support market-based programs that subsidize or create branding for products derived sustainably from managed wildlife habitats.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.26 Coordinate across federal, state and local agencies and approved consulting foresters that provide financial, logistical or planning assistance to woodland landowners to adopt or endorse consistent best management practices concerning controlled burns to maintain and/or improve forested habitat for wildlife.

100 Law and Policy

100.3 State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.32 Coordinate regulations across agencies to maximize availability of and enrollment in existing Forestry Stewardship Programs (e.g., "Woodland Stewards", Farm Bill, partners, etc.) to maintain and/or improve forest habitat.

Job 22.03. Protecting Priority Wetlands

Objective: Increase the regulatory protection of priority wetlands (e.g., fens, sinkhole ponds, vernal pools, etc.) beyond that already provided (i.e., require optimal biological buffers).

Purpose: Decrease the loss and/or degradation of wetland habitats as a result of land use activities such as development and agriculture that directly or indirectly alter the characteristic water quality conditions.

Benefits: Preserve wetlands through acquisition and subsequent management as needed, in addition to indirectly affording adjacent upland habitat preservation.

Focal wildlife species benefitting from this job

Birds

Black Rail	Common Tern	Forster's Tern
Little Blue Heron	Northern Harrier	Red Knot
Ruddy Turnstone	Snowy Egret	Tricolored Heron

Fish

Banded Sunfish	Blackbanded Sunfish	Bridle Shiner
Brook Trout	Comely Shiner	Ironcolor Shiner
Mud Sunfish	Swamp Darter	

Macroinvertebrates

Arogos Skipper	New England Bluet	Papaipema harrisii
Pine Barrens Bluet	Robust Baskettail	Septima's Clubtail

Superb Jewelwing

Mammals

Indiana Bat	Little Brown Bat	Northern Myotis

Reptiles & Amphibians

Bog Turtle	Carpenter Frog	Eastern Box Turtle
Eastern Redbelly Turtle	Eastern Spadefoot	Eastern Tiger Salamander
Longtail Salamander	New Jersey Chorus Frog	Northern Red Salamander
Pine Barrens Treefrog	Timber Rattlesnake	Wood Turtle

Threats and Action Drivers associated with this conservation need

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale)

1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.1.1.2 Loss, alteration and/or degradation of habitat.

1.1.1.5 Impervious surfaces can lead to a decrease in water recharge.

1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.1.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale)

1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.2.1.2 Loss, alteration and/or degradation of habitat.

1.2.1.5 Impervious surfaces can lead to a decrease in water recharge.

1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.2.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale)

1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.3.1.2 Loss, alteration and/or degradation of habitat.

1.3.1.4 Impervious surfaces can lead to a decrease in water recharge.

1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.3.1.6 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture

2.1.1.2 Conversion, and subsequent loss, of high salt marsh to low salt marsh threatens high-marsh dependent species and those dependent on the marsh-upland ecotone.

2.1.1.3 Conversion of agricultural landscape that results in increased erosion, runoff, and chemical and thermal pollution decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3 Livestock Farming and Ranching

2.3.3 Agro-industry Grazing

2.3.3.4 Livestock allowed to wade into waterbodies trample and degrade aquatic habitats.

2.4 Marine and Freshwater Aquaculture

2.4.1 Subsistence/Artisinal Aquaculture

2.4.1.1 May degrade freshwater and intertidal habitat due to farming techniques and damage from associated structures.

2.4.1.3 Potential for increased nutrient and effluent loads.

2.4.2 Industrial Aquaculture

2.4.2.1 May degrade freshwater and intertidal habitat due to farming techniques and damage from associated structures.

2.4.2.3 Potential for increased nutrient and effluent loads.

4 Transportation and Service Corridors

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads

4.2.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species, inhibiting dispersal of non-volant animals, reducing gene flow, and creating barriers to fish when service line-associated roads cross streams (e.g., bridges, culverts, fords, etc).

4.2.1.2 Loss, alteration and/or degradation of habitat associated with rights-of-way construction and maintenance, and degradation of adjacent habitats.

5 Biological Resource Use

5.3 Logging and Wood Harvesting

5.3.1 Intentional Use (subsistence/small scale)

5.3.1.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.1.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.2 Intentional Use (large scale)

5.3.2.2 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN may cause the loss, alteration and/or degradation of wildlife habitat.

5.3.2.3 Forestry and/or logging practices that are poorly planned/implemented or planned without consideration for SGCN and unsustainable forestry practices may increase soil erosion, impacting SGCN habitats.

5.3.3 Unintentional effects (subsistence/small scale)

5.3.3.1 Direct mortality of wildlife, direct loss of suitable habitats (roost, foraging, shelter, etc.), and can disrupt sensitive species, decreasing the likelihood of success and/or reproduction.

5.3.3.2 Poorly planned/implemented tree harvesting adjacent to waterways and vernal pools can lead to increased water temperatures, soil erosion and sedimentation, and reduces the potential for woody debris within the aquatic system, leading to negative impacts on wildlife.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized)

6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.

7 Natural Systems Modifications

7.2 Dams and Water Management/Use

7.2.5 Abstraction of Ground Water (domestic use)

7.2.5.1 Heavy withdrawal of ground water for domestic use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.7 Abstraction of Ground Water (agricultural use)

7.2.7.1 Heavy withdrawal of ground water for agricultural use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory

12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms

12.3.0.6 Certain geographic or habitat features, such as vernal pools and headwater wetlands or streams, may be too small, mischaracterized, or misidentified to benefit from regulatory protection.

Conservation actions that address Threats and Action Drivers

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.6 Secure and promote the protection/restoration of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers th

2 Direct Management of Natural Resources

2.1 Create new habitat or natural processes

2.10.0 Planting/seeding strategies for terrestrial or aquatic habitat creation or restoration

2.10.0.9 Restore and/or enhance riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation, alt

3 Data Collection and Analysis

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.1 Conduct habitat assessments of significant natural and/or unique communities to Identify threats to native terrestrial and aquatic habitats through systematic monitoring, review of available data, enlistment of habitat management and/or species experts, etc. Incorporate findings into a database that includes descriptions/qualifiers of the habitats, identifies and values/qualifies the threats, and includes a GIS component of the locations of the assessed areas. Share this information with landowners/managers (e.g., federal, state and local government agencies or non-government organization).

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.3 Secure and protect riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through an appropriate combination of fee title, non-fee title and landowner agreements.

6.3 Conservation area designation

6.3.0 Conservation area designation strategies

6.3.0.3 Increase the protection of riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation

7 Law Enforcement

7.1 Law enforcement

7.1.4 Scale Unspecified

7.1.4.6 Recruit law enforcement to assist in the protection and enhancement of SGCN populations, in particular endangered species, through improved awareness of species through trainings, partnerships, and other methods. Information should include but is not limited to: 1) Issues concerning illegal collection of reptiles, 2) Persecution of rare snakes, 3) Illegal recreational activities on public lands (e.g., off-road vehicles) and their impact on wildlife, 4) Identification of sensitive areas, critical sites and/or "hot-spots" for collection.

7.1.4.7 Increase law enforcement presence to enforce regulations governing recreational activities (e.g., the use of personal watercraft and off road vehicles, caving, rock climbing, etc.) on conserved lands and within other sensitive habitats, and discourage activities that cause harm or disturbance to vegetation, wetlands, fish and wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.33 Engage government agencies, conservation partners and other land managers, communities, landowners, and commercial and industrial stakeholders in discussions regarding the importance of protecting and methods to protect priority wetlands beyond the levels afforded through regulation by maintaining and/or restoring optimal biological buffers around wetlands.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and SGCN inhabiting them.

100 Law and Policy

100.1 Legislation

100.1.3 Sub-national Level

100.1.3.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.1.4 County and Local

100.1.4.7 Secure vernal pools and biologically appropriate buffers through local ordinances.

100.1.5 Scale Unspecified

100.1.5.1 Develop laws and policies to increase protection and biological buffers of wetlands.

100.3 State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.10 Develop policies that promote protecting vernal pool habitats to benefit SGCN that rely upon them and promotes connectivity of SGCN populations.

100.3.0.61 Develop regulations that when implemented will protect vernal pool habitats to benefit SGCN that rely upon them and promotes connectivity of SGCN populations.

Job 22.04. Preserving Land to Protect Critical Habitats for Lake and Pond Aquatic Species

Objective: Preserve lands around lake and pond habitats inhabited by Focal SGCN through land acquisition and regulatory protection and the implementation of biologically appropriate wetlands buffers.

Purpose: Provide the necessary and improved protection for pond and lake species to improve habitat availability and quality.

Benefits: Increase population numbers through the protection of habitat critical to foraging and improved water quality.

Focal wildlife species benefitting from this job

Fish

Banded Sunfish | Blackbanded Sunfish | Bridle Shiner

Ironcolor Shiner | Mud Sunfish | Swamp Darter

Macroinvertebrates

Eastern Lampmussel | New England Bluet | Pine Barrens Bluet

Robust Baskettail

Reptiles & Amphibians

Eastern Redbelly Turtle

Threats and Action Drivers associated with this conservation need

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale)

1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.1.1.2 Loss, alteration and/or degradation of habitat.

1.1.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.

1.1.1.5 Impervious surfaces can lead to a decrease in water recharge.

1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.1.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale)

1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.2.1.2 Loss, alteration and/or degradation of habitat.

1.2.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.

1.2.1.5 Impervious surfaces can lead to a decrease in water recharge.

1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.2.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale)

1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.3.1.2 Loss, alteration and/or degradation of habitat.

1.3.1.4 Impervious surfaces can lead to a decrease in water recharge.

1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.3.1.6 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

Conservation actions that address Threats and Action Drivers

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.3 Secure and protect riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through an appropriate combination of fee title, non-fee title and landowner agreements.

100 Law and Policy

100.3 State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.14 Develop policies and/or regulations that increase the protective buffers of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) to biologically appropriate distances to benefit SGCN that rely upon these habitats and improve the function of the [associated] aquatic systems.

Job 22.05. Conserved Lands, ORV Access, and State Recreational Area Policy

Objective: Map and codify roads and trails within conserved land that are available for motor vehicle access or recreational use and uphold/enforce through regulatory and/or policy implementation.

Purpose: Reduce, if not eliminate, habitat degradation and wildlife disturbance and other negative impacts of ORV use within conserved lands, in particular highly sensitive areas.

Benefits: Protection of critical habitats for SGCN, including but not limited to ephemeral and emergent wetlands, upland basking sites, rookeries (reptile and avian species), and related avian species congregation or foraging sites, thereby improving fecundity and longevity of the wildlife that depend upon their integrity.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	American Woodcock	Black Rail
Black Skimmer	Blue-winged Warbler	Bobolink
Cerulean Warbler	Common Tern	Eastern Meadowlark
Forster's Tern	Golden-winged Warbler	Grasshopper Sparrow
Kentucky Warbler	Least Tern	Little Blue Heron
Northern Bobwhite	Pied-billed Grebe	Piping Plover
Prothonotary Warbler	Red Knot	Red-headed Woodpecker
Ruddy Turnstone	Scarlet Tanager	Snowy Egret
Tricolored Heron	Vesper Sparrow	Wood Thrush

Fish

Banded Sunfish	Blackbanded Sunfish	Bridle Shiner
Brook Trout	Comely Shiner	Ironcolor Shiner
Mud Sunfish	Swamp Darter	

Macroinvertebrates

A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper
Ashton Cuckoo Bumble Bee	Brook Floater	Buchholz's Dart Moth
Buchholz's Gray	Carter's Noctuid Moth	Daecke's Pyralid Moth
Dotted Skipper	Dwarf Wedgemussel	Eastern Lampmussel
Frosted Elfin	Georgia Satyr	Green Floater
Hoary Elfin	Leonard's Skipper	Little White Tiger Beetle
Maritime Sunflower Borer Moth	New England Bluet	New Jersey Pine Barrens Tiger Beetle
Northeastern Beach Tiger Beetle	Northern Metalmark	Papaipema harrisii

Pine Barrens Bluet	Pink Sallow	Robust Baskettail
Rusty Patched Bumble Bee	Sand Myrtle Looper/Pink	Scarlet Bluet
Septima's Clubtail	Southeastern Beach Tiger Beetle	Southern Plains Bumble Bee
Superb Jewelwing	Triangle Floater	Variable Cuckoo Bumble Bee
Yellow Bumble Bee	Yellow Lampmussel	Yellow-banded Bumble Bee
Mammals		
Allegheny Woodrat	Indiana Bat	Little Brown Bat
Northern Myotis		
Reptiles & Amphibians		
Bog Turtle	Carpenter Frog	Corn Snake
Eastern Box Turtle	Eastern Hognose Snake	Eastern Redbelly Turtle
Eastern Spadefoot	Eastern Tiger Salamander	Longtail Salamander
New Jersey Chorus Frog	Northern Black Racer	Northern Diamondback Terrapin
Northern Pine Snake	Northern Red Salamander	Northern Scarlet Snake
Pine Barrens Treefrog	Timber Rattlesnake	Wood Turtle

Threats and Action Drivers associated with this conservation need

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized)

6.1.1.1 Inappropriate use of off-road vehicles creates new roads/trails which fragments habitat.

6.1.1.2 Inappropriate use of off-road vehicles can degrade terrestrial and aquatic habitat and reduce the suitability of adjacent habitats for wildlife.

6.1.1.3 Increased risk of harassment that results in a change in wildlife behavior and/or direct mortality from vehicle strikes.

6.1.1.4 Increased noise pollution.

6.1.1.5 Vehicle use on beaches can cause disturbance, harms breeding and foraging habitats, and can cause direct mortality of beach-nesting birds.

6.1.1.6 Off-road vehicles can be a mechanism of transference of wildlife diseases and invasive plant species if gear and apparel are not properly sanitized between sites.

Conservation actions that address Threats and Action Drivers

5 Facilities and Areas

5.15 Wildlife Management Areas

5.15.6 Roads

5.15.6.1 Clearly post areas/roads where vehicle access is permitted.

5.15.6.2 Clearly post areas/trails where vehicle access is not permitted.

7 Law Enforcement

7.1 Law enforcement

7.1.4 Scale Unspecified

7.1.4.6 Recruit law enforcement to assist in the protection and enhancement of SGCN populations, in particular endangered species, through improved awareness of species through trainings, partnerships, and other methods. Information should include but is not limited to: 1) Issues concerning illegal collection of reptiles, 2) Persecution of rare snakes, 3) Illegal recreational activities on public lands (e.g., off-road vehicles) and their impact on wildlife, 4) Identification of sensitive areas, critical sites and/or "hot-spots" for collection.

7.1.4.7 Increase law enforcement presence to enforce regulations governing recreational activities (e.g., the use of personal watercraft and off road vehicles, caving, rock climbing, etc.) on conserved lands and within other sensitive habitats, and discourage activities that cause harm or disturbance to vegetation, wetlands, fish and wildlife.

9 Planning

9.2 Organizational strategic and CMS planning

9.2.1 Organizational strategic and operational planning

9.2.1.1 Identify and codify legal ORV access areas on state lands.

9.3 Species and habitat management planning

9.3.3 Habitat management planning

9.3.3.29 Develop habitat management plans aimed at reducing or eliminating negative impacts of ORVs.

100 Law and Policy

100.3 State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.14 Develop policies and/or regulations that increase the protective buffers of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) to biologically appropriate distances to benefit SGCN that rely upon these habitats and improve the function of the [associated] aquatic systems.

100.3.0.21 Develop policies that minimize wildlife road mortality through: 1) Requiring the integration of wildlife passages into all new and repaired roads, in particular those areas that will connect SGCN habitats, 2) Requiring current fish/wildlife passages be improved and maintained in perpetuity, 3) Supporting seasonal road closures, in particular for unimproved roads, 4) Supporting projects that work to improve connectivity of SGCN habitats such as land conservation through acquisition or other means.

100.3.0.69 Develop regulations that when implemented will minimize wildlife road mortality.

Project 23. Land Use Planning

Job 23.01. Transportation, Service, and Pipeline Corridors: Inland

Objective: Minimize the impacts of new and/or the expansion of linear development (e.g., transportation, service, and pipeline corridors, etc.) by using wildlife habitat and corridor mapping products for planning and project review to better integrate proactive habitat connectivity efforts.

Purpose: Minimize direct and indirect impacts of energy and transportation corridors on terrestrial-bound wildlife and invertebrates.

Benefits: Maintain and/or minimize impacts on core and corridor habitat for and population persistence of SGCN terrestrial wildlife.

Focal wildlife species benefitting from this job

Birds

American Woodcock	Black Rail	Northern Bobwhite

Macroinvertebrates

A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper
Ashton Cuckoo Bumble Bee	Buchholz's Dart Moth	Buchholz's Gray
Carter's Noctuid Moth	Daecke's Pyralid Moth	Dotted Skipper
Frosted Elfin	Georgia Satyr	Hoary Elfin
Leonard's Skipper	Little White Tiger Beetle	Maritime Sunflower Borer Moth
New Jersey Pine Barrens Tiger Beetle	Northeastern Beach Tiger Beetle	Northern Metalmark
Papaipema harrisii	Pink Sallow	Rusty Patched Bumble Bee
Sand Myrtle Looper/Pink	Southeastern Beach Tiger Beetle	Southern Plains Bumble Bee
Variable Cuckoo Bumble Bee	Yellow Bumble Bee	Yellow-banded Bumble Bee

Mammals

Allegheny Woodrat

Reptiles & Amphibians

Bog Turtle	Carpenter Frog	Corn Snake
Eastern Box Turtle	Eastern Hognose Snake	Eastern Redbelly Turtle
Eastern Spadefoot	Eastern Tiger Salamander	Longtail Salamander
New Jersey Chorus Frog	Northern Black Racer	Northern Diamondback Terrapin
Northern Pine Snake	Northern Red Salamander	Northern Scarlet Snake

Pine Barrens Treefrog | Timber Rattlesnake | Wood Turtle

Threats and Action Drivers associated with this conservation need

3 Energy Production and Mining

3.1 Oil and Gas Facilities and Pipelines

3.1.1 Distribution processes of petroleum and other liquid hydrocarbons

3.1.1.1 Fragments terrestrial and aquatic habitats.

3.1.1.2 Loss, alteration and/or degradation of habitat.

3.1.2 Natural gas distribution processes

3.1.2.1 Fragments terrestrial and aquatic habitats.

3.1.2.2 Loss, alteration and/or degradation of habitat.

3.2 Mining and Quarrying

3.2.2 Surface Mining - Rock Quarry (and sand quarries)

3.2.2.1 Fragments terrestrial and aquatic habitats.

3.2.2.2 Loss, alteration and/or degradation of habitat.

3.3 Renewable Energy

3.3.1 Wind Power

3.3.1.2 Fragments terrestrial habitats.

3.3.1.3 Loss, alteration and/or degradation of habitat.

3.3.1.4 Increased commercial infrastructure.

3.3.2 Solar Power

3.3.2.1 Fragments terrestrial habitats.

3.3.2.2 Loss, alteration and/or degradation of habitat.

3.3.2.3 Increased commercial infrastructure.

4 Transportation and Service Corridors

4.1 Roads and Railroads

4.1.1 Land conversion from natural habitat to roads and railroads (large and small scale)

4.1.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species and inhibiting dispersal of non-volant animals, reducing gene flow.

4.2 Utility and Service Lines

4.2.1 Land conversion from natural habitat to utility and other service lines (large and small scale) or communication towers and associated access roads

4.2.1.1 Fragments terrestrial and aquatic habitats making the landscape unsuitable for area-sensitive species, inhibiting dispersal of non-volant animals, reducing gene flow, and creating barriers to fish when service line-associated roads cross streams (e.g., bridges, culverts, fords, etc).

12 Resource Management Needs

12.1 Resource information collection needs

12.1.2 Lack of up-to-date existing information

12.1.2.2 Lack of wildlife monitoring at sites with structures that pose high risk of mortality to SGCN wildlife.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

3 Data Collection and Analysis

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.3 Baseline inventory

3.2.3.7 Identify roads or portions of roads, paved or unimproved (through site surveys, land use/land cover assessments and analyses, review of available data, enlistment of species experts, etc.) with high incidences of road mortality and/or presence of snakes, turtles, medium-sized and large mammals. Conduct assessments of the roads and incorporate information into a database that includes descriptions (e.g., qualifiers to help prioritize the roads' risk to wildlife) and a GIS component of the locations of such areas. Share this information with appropriate organizations and/or agencies working to implement measures (e.g., wildlife passages, road closures) to minimize the risk to these species.

3.5 Techniques development

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.9 Conduct studies to evaluate the impacts of roads on SGCN and develop, implement and conduct studies to evaluate the effectiveness of methods to reduce road mortality of wildlife (e.g. wildlife underpasses, road closures).

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.10 Use CHANJ mapping in reviews of proposed energy, mining, transportation and utility service companies/agencies' projects to attempt to maintain habitat connectivity and reduce fragmentation, and identify potential impacts of the projects.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.7 Provide educational resources, training programs, and on-the-ground guidance to energy, mining, transportation, and utility service agencies/companies and their project and resource managers on the importance of maintaining habitat connectivity, minimizing fragmentation, and the use of CHANJ products to help them target areas for such planning.

100 Law and Policy

100.3 State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.52 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded energy sitings and facilities.

100.3.0.53 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded rights-of-way corridors associated with energy transport/transmission.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100.4 State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.4 Create a policy that requires the use of wildlife habitat and corridor mapping products for both regulatory use when conducting project reviews and planning/siting new or expanded rights-of-way projects.

100.4.0.8 Develop a white paper addressing the impacts that existing, new or expanded rights-of-way have upon wildlife, wildlife habitats and habitat connectivity.

Job 23.02. Renewable Energy

Objective: Identify brownfields and developed areas where solar and wind energy facilities could be sited with minimal impacts to migratory wildlife and minimal habitat fragmentation.

Purpose: Minimize the impacts of solar and wind farms on migratory species (birds, bats, and invertebrates) and species vulnerable to fragmentation.

Benefits: Reduce mortality of wildlife caused by poorly-sited wind turbines and reduce habitat fragmentation and loss cause by the conversion of natural lands to energy generation uses, while encouraging renewable energy generation on old industrial sites and urban rooftops.

Focal wildlife species benefitting from this job

Birds

American Woodcock	Blue-winged Warbler	Bobolink
Cerulean Warbler	Eastern Meadowlark	Golden-winged Warbler
Grasshopper Sparrow	Kentucky Warbler	Northern Bobwhite
Peregrine Falcon	Prothonotary Warbler	Red-headed Woodpecker
Scarlet Tanager	Vesper Sparrow	Wood Thrush

Mammals

Indiana Bat	Little Brown Bat	Northern Myotis

Reptiles & Amphibians

Corn Snake	Eastern Hognose Snake	Northern Black Racer
Northern Pine Snake	Northern Scarlet Snake	Timber Rattlesnake

Threats and Action Drivers associated with this conservation need

3 Energy Production and Mining

- 3.3 Renewable Energy
  - 3.3.1 Wind Power
    - 3.3.1.1 Turbines, blades, and structure foundations create a collision risk to volant species (birds, bats and invertebrates) and marine animals.
    - 3.3.1.2 Fragments terrestrial habitats.
    - 3.3.1.3 Loss, alteration and/or degradation of habitat.
    - 3.3.1.4 Increased commercial infrastructure.
  - 3.3.2 Solar Power
    - 3.3.2.1 Fragments terrestrial habitats.

3.3.2.2 Loss, alteration and/or degradation of habitat.

3.3.2.3 Increased commercial infrastructure.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.1.6 Lack of information regarding migratory pathways and response of wildlife to lights and noise associated with offshore wind turbines.

12.1.2 Lack of up-to-date existing information

12.1.2.2 Lack of wildlife monitoring at sites with structures that pose high risk of mortality to SGCN wildlife.

12.1.3 Need to answer research question

12.1.3.4 Lack of information regarding the potential short- and long-term impacts of wind turbines and other tall coastal structures on migratory populations.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.25 Identify pathways of migratory SGCN in the Atlantic Coastal and Marine Regions (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and use the data to help evaluate the potential short- and long-term impacts of wind turbines, radio towers, utility guy lines, and other tall coastal structures on migratory populations.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.17 Conduct monitoring at constructed wind farms (within or outside of NJ) to assess the impacts on migratory species (birds, bats, insects) and determine if NJ's land use planning efforts and/or smart-growth plans need to be revised.

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and the SGCN inhabiting them.

9.1.0.2 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.12 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed solar and/or wind farm projects to reduce habitat fragmentation and minimize impacts on wildlife.

Job 23.03. Habitat Management within the "Clear Zone" of Roads

Objective: Identify "clear zone" areas along roads and within road medians where it would be appropriate, and not likely to increase wildlife mortality, to manage habitat for wildlife and implement management of these areas (e.g., plant native herbaceous plant species to increase habitat suitability for insects and birds) as appropriate.

Purpose: Repurpose roadside habitat conditions in suitable areas to benefit wildlife where linear development has altered or degraded habitat.

Benefits: Increase in habitat availability and diversity in under-utilized area and improve habitat conditions.

Focal wildlife species benefitting from this job

Birds

American Woodcock	Black Rail	Blue-winged Warbler
Bobolink	Cerulean Warbler	Common Tern
Eastern Meadowlark	Forster's Tern	Golden-winged Warbler
Grasshopper Sparrow	Kentucky Warbler	Little Blue Heron
Northern Bobwhite	Northern Harrier	Peregrine Falcon
Pied-billed Grebe	Prothonotary Warbler	Red-headed Woodpecker
Scarlet Tanager	Snowy Egret	Vesper Sparrow
Wood Thrush		

Fish

Banded Sunfish	Blackbanded Sunfish	Bridle Shiner
Brook Trout	Comely Shiner	Ironcolor Shiner
Mud Sunfish	Swamp Darter	

Macroinvertebrates

A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper
Ashton Cuckoo Bumble Bee	Buchholz's Dart Moth	Buchholz's Gray
Carter's Noctuid Moth	Daecke's Pyralid Moth	Dotted Skipper
Frosted Elfin	Georgia Satyr	Hoary Elfin
Leonard's Skipper	Little White Tiger Beetle	Maritime Sunflower Borer Moth
New England Bluet	New Jersey Pine Barrens Tiger Beetle	Northeastern Beach Tiger Beetle
Northern Metalmark	Papaipema harrisii	Pine Barrens Bluet
Pink Sallow	Robust Baskettail	Rusty Patched Bumble Bee
Sand Myrtle Looper/Pink	Scarlet Bluet	Septima's Clubtail
Southeastern Beach Tiger Beetle	Southern Plains Bumble Bee	Superb Jewelwing
Triangle Floater	Variable Cuckoo Bumble Bee	Yellow Bumble Bee
Yellow-banded Bumble Bee		

Mammals

Allegheny Woodrat	Indiana Bat	Little Brown Bat
Northern Myotis		

Reptiles & Amphibians

Bog Turtle	Carpenter Frog	Corn Snake
Eastern Box Turtle	Eastern Hognose Snake	Eastern Redbelly Turtle
Eastern Spadefoot	Eastern Tiger Salamander	Longtail Salamander
New Jersey Chorus Frog	Northern Black Racer	Northern Diamondback Terrapin
Northern Pine Snake	Northern Red Salamander	Northern Scarlet Snake
Pine Barrens Treefrog	Timber Rattlesnake	Wood Turtle

Threats and Action Drivers associated with this conservation need

7 Natural Systems Modifications

7.3 Other Ecosystem Modifications

7.3.5 Poor habitat management

7.3.5.1 Improper or poorly scheduled maintenance of man-made corridors (e.g., roadsides and medians) can cause direct mortality to and may reduce productivity of wildlife.

7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory

12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

Conservation actions that address Threats and Action Drivers

2 Direct Management of Natural Resources

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.26 Conduct vegetation management along roadsides and medians, avoiding peak activity periods for wildlife, that enhances wildlife dispersal naturally and safely across roads and similar barriers to/between terrestrial and/or aquatic habitats.

3 Data Collection and Analysis

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.1 Abundance determination

3.2.1.2 Conduct wildlife surveys on resident and migratory SGCN regarding their population abundance and trends.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.1.6 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) that could, through revegetation and/or enhancement efforts, become suitable travel corridors connecting and increasing the effective size of conserved habitats for SGCN.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.18 Engage NJDOT, NJ Transit Authority and other road management entities, wildlife conservation organizations/agencies (e.g., Division of Fish and Wildlife, New Jersey Conservation Foundation, Conserve Wildlife Foundation of NJ), and communities and citizens in discussions regarding the importance of and methods to enhance habitat connectivity, and work together to develop feasible strategies for ensuring that wildlife can disperse naturally and safely across roads and similar barriers to terrestrial and/or aquatic habitats.

9 Planning

9.3 Species and habitat management planning

9.3.3 Habitat management planning

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

100 Law and Policy

100.3 State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.31 Create or expand tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMPs.

Job 23.04. Secondary Impact Analysis Ordinances

Project 23. Research and Monitoring

Objective: Work with the Association of New Jersey Environmental Commissions (ANJEC) to develop model municipal ordinances that require the full assessment of secondary impacts of development in particular development adjacent to natural/conserved lands, when revising local planning or zoning documents or when granting site plan/subdivision approvals. Examples of impacts include residential-edge burn obligations by NJ Forest Fire Service, increased ORV access and its effects, expanded mosquito control, increased deer populations resulting from hunting restrictions in developed areas, and lack of vegetated buffers to protect adjacent natural areas.

Purpose: Minimize or mitigate for impacts to forest species and forest ecology that would be expected to result from activities often associated with new development, including actions required for public safety (e.g., prescribed burns to reduce fuel, mosquito control, etc.).

Benefits: Maintain the quality of existing wildlife habitats adjacent to new development.

Focal wildlife species benefitting from this job

Birds

American Woodcock	Blue-winged Warbler	Cerulean Warbler
Golden-winged Warbler	Kentucky Warbler	Northern Bobwhite
Prothonotary Warbler	Red-headed Woodpecker	Scarlet Tanager
Wood Thrush		

Fish

Banded Sunfish	Blackbanded Sunfish	Bridle Shiner
Brook Trout	Comely Shiner	Ironcolor Shiner
Mud Sunfish	Swamp Darter	

Macroinvertebrates

A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper
Ashton Cuckoo Bumble Bee	Brook Floater	Buchholz's Dart Moth
Buchholz's Gray	Carter's Noctuid Moth	Daecke's Pyralid Moth
Dotted Skipper	Dwarf Wedgemussel	Eastern Lampmussel
Frosted Elfin	Georgia Satyr	Green Floater
Hoary Elfin	Leonard's Skipper	Maritime Sunflower Borer Moth
New England Bluet	New Jersey Pine Barrens Tiger Beetle	Northern Metalmark
Papaipema harrisii	Pine Barrens Bluet	Pink Sallow
Robust Baskettail	Rusty Patched Bumble Bee	Sand Myrtle Looper/Pink
Scarlet Bluet	Septima's Clubtail	Southern Plains Bumble Bee

Superb Jewelwing	Triangle Floater	Variable Cuckoo Bumble Bee
Yellow Bumble Bee	Yellow Lampmussel	Yellow-banded Bumble Bee

Mammals

Allegheny Woodrat	Indiana Bat	Little Brown Bat
Northern Myotis		

Reptiles & Amphibians

Bog Turtle	Carpenter Frog	Corn Snake
Eastern Box Turtle	Eastern Hognose Snake	Eastern Redbelly Turtle
Eastern Spadefoot	Eastern Tiger Salamander	Longtail Salamander
New Jersey Chorus Frog	Northern Black Racer	Northern Pine Snake
Northern Red Salamander	Northern Scarlet Snake	Pine Barrens Treefrog
Timber Rattlesnake	Wood Turtle	

Threats and Action Drivers associated with this conservation need

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale)

1.1.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.1.1.2 Loss, alteration and/or degradation of habitat.

1.1.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.

1.1.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.

1.1.1.5 Impervious surfaces can lead to a decrease in water recharge.

1.1.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.1.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale)

1.2.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.2.1.2 Loss, alteration and/or degradation of habitat.

1.2.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.

1.2.1.4 Increased risk of vehicle strikes/mortality to terrestrial-bound and some bird species.

1.2.1.5 Impervious surfaces can lead to a decrease in water recharge.

1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.2.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale)

1.3.1.1 Fragments terrestrial and aquatic habitats making the area unsuitable for area-sensitive species and inhibit dispersal of animals, reducing gene flow.

1.3.1.2 Loss, alteration and/or degradation of habitat.

1.3.1.3 Lot layout, design and/or landscaping may create conditions that increase wildlife-human conflict.

1.3.1.4 Impervious surfaces can lead to a decrease in water recharge.

1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.3.1.6 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.2 Small-holder Farming

2.1.2.2 Fragments terrestrial and aquatic habitats.

2.1.3 Agro-industry

2.1.3.2 Fragments terrestrial and aquatic habitats.

2.1.3.5 Loss of ecotones by implementing clean farming (edge-to-edge) practices degrades habitat for early successional wildlife.

12 Resource Management Needs

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

Conservation actions that address Threats and Action Drivers

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.15 Engage government agencies, conservation partners and other stakeholders in discussions encouraging and supporting the creation of laws and policies requiring vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

8.1.0.16 Engage local governments in discussions regarding the importance of them adopting/passing ordinances which require assessing and addressing secondary impacts (i.e., ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

11 Technical Assistance

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.25 Provide educational resources, training programs, and on-the-ground guidance to resource managers regarding the assessment of and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) related to residential and commercial development.

100 Law and Policy

100.1 Legislation

100.1.4 County and Local

100.1.4.14 Adopt/pass local ordinances which require assessing and addressing secondary impacts (i.e. ancillary prescribed burns, trespassers, ORV use, mosquitoes, deer, buffers) on biological resources when revising planning/zoning documents or granted site plan/subdivision approvals.

100.3 State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Project 24. Marine Protection

Job 24.01. Marine Spatial Planning

Objective: Develop a plan that prioritizes near-shore coastal species and habitats that may be negatively affected by sea level rise, flooding, and increased storm surges, and implement efforts to minimize impacts.

Purpose: Provide guidance on methods to minimize the impacts of sea level rise, flooding, and increased storms/surges on priority near-shore coastal habitats and wildlife.

Benefits: Ameliorate the impacts of sea-level rise, flooding, and storms, and preserve biological diversity through the preservation of diverse habitats that would otherwise be lost as a result of salt water inundation.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	Black Rail	Black Skimmer
Common Tern	Forster's Tern	Least Tern
Little Blue Heron	Northern Harrier	Piping Plover
Red Knot	Ruddy Turnstone	Snowy Egret
Tricolored Heron		

Fish

Alewife	Atlantic Sturgeon	Blueback Herring
Shortnose Sturgeon		

Mammals

North Atlantic Right Whale

Reptiles & Amphibians

Atlantic Green Turtle	Atlantic Leatherback	Atlantic Loggerhead
Atlantic Ridley	Northern Diamondback Terrapin	

Threats and Action Drivers associated with this conservation need

11 Climate Change and Severe Weather

11.4 Storms and Flooding

11.4.1 Storms and flooding

11.4.1.2 Potentially damage coastal habitats, including beach- and marsh-nesting bird habitats and interdunal wetlands, and can increase marsh erosion.

11.5 Sea-level Rise

11.5.0 Sea-level Rise

11.5.0.1 Contributes to the conversion of high salt marsh to low salt marsh, threatening species that depend on high marsh habitat and those dependent on the marsh-upland ecotone.

11.5.0.4 Increased erosion of beach, mudflat and marsh habitats critical for a number of coastal species to fulfill life history requirements.

11.5.0.5 Sea-level rise will result in the conversion of some upland habitats to tidal marshes impacting the species that rely upon those upland areas.

11.5.0.7 Sea level rise exacerbates marsh loss caused by prior human manipulations (e.g., impoundments, grid-ditching) that reduced the elevation of the marsh.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory

12.1.1.4 Lack of information on the morphometrics and trends of coastal salt marshes and salt marsh islands.

12.1.2 Lack of up-to-date existing information

12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

2 Direct Management of Natural Resources

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.46 Implement sediment augmentation techniques on tidal salt marshes to offset marsh subsidence and effects of sea level rise, and to stabilize tidal marsh ecosystem.

3 Data Collection and Analysis

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.16 Gather "best information" for spatial modeling and update/create a current model/depiction of anticipated habitat shifts from sea-level rise, flooding, etc.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

9.3.3 Habitat management planning

9.3.3.25 Develop a habitat management plan focused on areas important to near-shore, coastal species (e.g., herring, sturgeon, terrapin, nesting birds) that prioritizes these areas to direct resources to minimize the impacts of sea-level rise, flooding and storms (including extreme rain events) such as increased erosion of beach, mudflat and marsh habitats, and the increased risk of saltwater intrusion into freshwater habitats. Gather "best information" for spatial modeling of anticipated habitat shifts from sea-level rise, flooding, etc.

Job 24.02. Submarine and Pipeline Construction Requirements for Minimizing Impacts

Objective: Support the development, implementation, and enforcement of improved submarine and pipeline construction requirements, through State regulations or policy, that minimize harm to benthic and marine biota.

Purpose: Reduce the loss of benthic and marine biota as a result of construction activities associated with submarine cable and pipeline installation.

Benefits: Protection for benthic and marine biota from the activities associated with the installation submarine cable and pipeline.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher | Black Skimmer | Least Tern

Piping Plover | Red Knot | Ruddy Turnstone

Fish

Alewife | Atlantic Sturgeon | Blueback Herring

Shortnose Sturgeon

Mammals

North Atlantic Right Whale

Reptiles & Amphibians

Atlantic Green Turtle	Atlantic Leatherback	Atlantic Loggerhead
Atlantic Ridley	Northern Diamondback Terrapin	

Threats and Action Drivers associated with this conservation need

3 Energy Production and Mining

3.1 Oil and Gas Facilities and Pipelines

3.1.1 Distribution processes of petroleum and other liquid hydrocarbons

3.1.1.1 Fragments terrestrial and aquatic habitats.

3.1.1.2 Loss, alteration and/or degradation of habitat.

3.1.2 Natural gas distribution processes

3.1.2.1 Fragments terrestrial and aquatic habitats.

3.1.2.2 Loss, alteration and/or degradation of habitat.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.11 Use the best available science (species data, habitat present, site layout options, etc.) when conducting regulatory reviews of proposed offshore energy projects relating to drilling, extraction and distribution of petroleum and gas products to reduce habitat destruction and minimize impacts on wildlife.

100 Law and Policy

100.3 State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.49 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address the issue of disturbance to habitat or species as a result of human activites (e.g., construction, bridge maintenance, road work, etc.).

Job 24.03. Marine Species Education

Objective: Educate the public and individuals involved in commercial aquaculture and commercial fishing on actionable steps to reduce the impacts to marine resources (animals and habitats) caused by 1) marine debris (e.g., abandoned traps, coastal debris), 2) shellfish aquaculture (e.g., structures, equipment), and 3) fisheries and shellfisheries bycatch.

Purpose: Reduce impacts on marine wildlife and habitats from commercial aquaculture and commercial fishing activities.

Benefits: Reduce accidental harm to non-targeted marine species and provide opportunity for the aquaculture industry to consider non-targeted marine species when maintaining and/or harvesting their products.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	Black Rail	Black Skimmer
Common Tern	Forster's Tern	Least Tern
Little Blue Heron	Pied-billed Grebe	Piping Plover
Red Knot	Red-headed Woodpecker	Ruddy Turnstone
Tricolored Heron		

Fish

Alewife	Atlantic Sturgeon	Blueback Herring
Shortnose Sturgeon		

Mammals

North Atlantic Right Whale

Reptiles & Amphibians

Atlantic Green Turtle	Atlantic Leatherback	Atlantic Loggerhead
Atlantic Ridley	Northern Diamondback Terrapin	

Threats and Action Drivers associated with this conservation need

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats

14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions

14.2.1.2 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various aquatic and riparian management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

8 Outreach

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.20 Develop an educational outreach program for landowners, particularly those in the coastal and bay areas, boaters, and the general public with information about the negative impacts on marine wildlife and habitats, and steps they can implement to reduce these impacts.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

Project 25. Fisheries Management

Job 25.01. Ecosystem Management for Fisheries Management

Objective: Apply ecosystem-based strategies to freshwater and marine fisheries management.

Purpose: Enhance the sustainability of fishery resources in freshwater and marine environments.

Benefits: Management of fisheries resources through the application of ecosystem-based strategies can enhance the sustainability of the resource through the management of multiple related trophic levels and their associated environments.

Focal wildlife species benefitting from this job

Fish

Alewife	Atlantic Sturgeon	Banded Sunfish
Blackbanded Sunfish	Blueback Herring	Bridle Shiner
Brook Trout	Comely Shiner	Ironcolor Shiner
Mud Sunfish	Shortnose Sturgeon	Swamp Darter

Threats and Action Drivers associated with this conservation need

1 Residential and Commercial Development

1.1 Housing and Urban Areas

1.1.1 Land conversion from natural habitat to urban and other residential areas (large and small scale)

1.1.1.5 Impervious surfaces can lead to a decrease in water recharge.

1.1.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.2 Commercial and Industrial Areas

1.2.1 Land conversion from natural habitat to commercial or industrial areas (large and small scale)

1.2.1.6 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.2.1.7 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

1.3 Tourism and Recreational Areas

1.3.1 Land conversion from natural habitat to recreation or tourism areas (large and small scale)

1.3.1.5 Impervious surfaces can cause an increased risk of floods, flash floods and storm damage that degrade terrestrial and aquatic habitats.

1.3.1.6 Impervious surfaces can cause an increase in temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture

2.1.1.3 Conversion of agricultural landscape that results in increased erosion, runoff, and chemical and thermal pollution decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3 Livestock Farming and Ranching

2.3.2 Small-holder Grazing

2.3.2.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

2.3.3 Agro-industry Grazing

2.3.3.3 Conversion of natural stream buffers into pastures decreases the landscape's ability to buffer aquatic systems from various forms of terrestrial degradation.

5 Biological Resource Use

5.4 Fishing and Harvesting of Aquatic Resources

5.4.3 Unintentional effects (subsistence/small scale)

5.4.3.7 Improperly sanitized equipment, relocation of fish, importation and release of non-native species, and the use of bait from a different location can spread invasive species and diseases from one waterbody to another.

5.4.4 Unintentional effects (large scale)

5.4.4.7 Improperly sanitized equipment, relocation of fish, importation and release of non-native species, and the use of bait from a different locations can spread invasive species and diseases from one waterbody to another.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.2 Boating

6.1.2.5 Watercraft can be a mechanism of transference of wildlife diseases and invasive plant species if gear is not properly sanitized between sites.

6.3 Work and Other Activities

6.3.1 Unauthorized research projects at significant habitats

6.3.1.1 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.1.4 Illegal transfer of freshwater fish from one waterbody/watershed to another can result in the spread of non-native, invasive and/or undesirable fish or mussel species and/or diseases.

6.3.2 Authorized research projects at significant habitats

6.3.2.2 Participants may introduce wildlife diseases and invasive plant species when gear and apparel is not properly sanitized between sites.

6.3.2.5 Authorized transfer of freshwater fish from one waterbody/watershed to another can result in the spread of non-native, invasive and/or undesirable fish or mussel species and/or diseases.

7 Natural Systems Modifications

7.2 Dams and Water Management/Use

7.2.1 Abstraction of Surface Water (domestic use)

7.2.1.1 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.1.2 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.1.3 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, and eliminates shallow water habitats.

7.2.1.4 Water intake systems associated with municipal water supply threaten aquatic organisms due to injury or mortality from impingement and/or entrainment.

7.2.1.5 Abstraction of surface water may deplete upland mesic habitats of water needed by plants and wildlife.

7.2.1.6 Impoundments may alter the water levels in high marshes and mudflats, impacting those foraging and nesting habitats.

7.2.2 Abstraction of Surface Water (commercial use)

7.2.2.1 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, eliminates shallow water habitats, and disrupts/removes stream bottom habitat.

7.2.2.2 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.2.3 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.2.4 Water intake systems associated with industrial use and power plants threaten aquatic organisms due to injury or mortality from impingement and/or entrainment.

7.2.2.5 Abstraction of surface water may deplete upland mesic habitats of water needed by plants and wildlife.

7.2.2.6 Impoundments may alter the water levels in high marshes and mudflats, impacting those foraging and nesting habitats.

7.2.3 Abstraction of Surface Water (agricultural use)

7.2.3.1 Controlled water releases and/or improper water level management of water bodies may alter downstream dissolved oxygen levels, water temperatures, sediment deposition, and flow rates, altering wildlife behavior and survival.

7.2.3.2 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, and eliminates shallow water habitats.

7.2.3.3 Impounding water to create or expand bogs for cranberry farming leads to the loss of natural wetlands and the alteration of the natural hydrology in the area.

7.2.3.4 Water intake systems associated with agriculture threaten aquatic organisms due to injury or mortality from impingement and/or entrainment.

7.2.3.5 Changing water levels due to water body drawdowns (legal and illegal) may lower dissolved oxygen levels, increase water temperatures, expose wildlife to predation, and increase exposure to winter temperatures, altering wildlife behavior and survival.

7.2.3.6 Abstraction of surface water may deplete upland mesic habitats of water needed by plants and wildlife.

7.2.3.7 Impoundments may alter the water levels in high marshes and mudflats, impacting those foraging and nesting habitats.

7.2.5 Abstraction of Ground Water (domestic use)

7.2.5.1 Heavy withdrawal of ground water for domestic use may lower water tables and alter the hydrology of freshwater wetlands and headwater streams, including tributaries, seepages and vernal pools.

7.2.9 Small Dams

7.2.9.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.9.2 Dams act as a barrier to fish movement, limiting the distribution of anadromous fish and fish that act as hosts for mussels.

7.2.9.3 Dams act as a barrier to movement, limiting the ability of aquatic or semi-aquatic wildlife to move safely between habitats.

7.2.10 Large Dams

7.2.10.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.10.2 Dams act as a barrier to fish movement, limiting the distribution of anadromous fish and fish that act as hosts for mussels.

7.2.10.3 Dams act as a barrier to movement, limiting the ability of aquatic or semi-aquatic wildlife to move safely between habitats.

7.2.11 Dams (size unknown)

7.2.11.1 Alter the physical, chemical and biological stream environment, causing changes in substrate composition, flow rates, dissolved oxygen, and water temperatures.

7.2.11.2 Dams act as a barrier to fish movement, limiting the distribution of anadromous fish and fish that act as hosts for mussels.

7.2.11.3 Dams act as a barrier to movement, limiting the ability of aquatic or semi-aquatic wildlife to move safely between habitats.

7.2.12 Culverts

7.2.12.1 Improper design, placement, installation and maintenance of culverts and other stream crossing structures can impede or prevent the movements of terrestrial organisms and can restrict or limit stream flow, impeding the movement of aquatic organisms along riparian corridors.

7.2.13 Stream Burrial

7.2.13.3 Alters the hydrology and quality of downstream aquatic and riparian habitats.

7.3 Other Ecosystem Modifications

7.3.3 Removal of coarse woody debris (streams, forests, scrub-shrub habitats)

7.3.3.1 Decreases the available detritus that normally accumulates behind and within stream obstructions, minimizing or eliminating food sources and shelters for fishes, invertebrates and amphibians.

7.3.3.2 Decreases habitat and/or corridor suitability due to limited or absent shelter and foraging habitat.

7.3.3.4 Decreases available basking, shelter, and foraging habitats.

7.3.5 Poor habitat management

7.3.5.2 Shifting from natural vegetation to lawns can cause increased temperatures of local aquatic systems making them unsuitable (or less suitable) for aquatic species' reproduction and survival.

7.3.5.4 Vegetation clearing or inappropriate alteration adjacent to aquatic habitats threatens aquatic species by degrading habitat and water quality (altering temperature and dissolved oxygen, increasing siltation and dessication, etc.).

7.3.5.8 Storm water outfall pipes can create habitats in small streams that are conducive to non-native predatory fish which can negatively impact native fish species.

7.3.5.9 Channelization alters water volume and flow rates, removes aquatic vegetation and coarse, woody debris, eliminates shallow water habitats, and disrupts/removes stream bottom habitat.

7.3.5.10 Ditching, draining and filling of marshes and wetlands eliminates habitat and degrades the remaining surrounding areas for wildlife.

7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.2 Invasive non-native aquatic animals

8.1.2.1 Parasites introduced into the marine environment can alter the reproductive and feeding behavior of native wildlife, leading to their decline.

8.1.2.2 Displace or out-compete native species for resources (food, shelter), alter the composition of the native landscapes/aquatic systems, diminishing habitat suitability and reducing ecological integrity of natural communities, and may introduce disease into a population.

8.1.3 Invasive non-native aquatic plants

8.1.3.1 Displace or out-compete native species for resources (food, light, shelter), alter the composition of the native landscapes/aquatic systems, diminish habitat suitability and reduce ecological integrity of natural communities, and may introduce disease into a population.

9 Pollution

9.1 Domestic and Urban Waste Water

9.1.1 Sewage

9.1.1.1 Degradation of aquatic and marine water quality and habitats by changing turbidity, flow and water chemistry.

9.1.1.2 Leads to increased eutrophication and algae blooms that result in oxygen depletion.

9.1.1.3 Contaminants in sewage treatment effluents and Combined Sewer Overflows can cause developmental and behavioral abnormalities and reproductive failure in wildlife.

9.1.2 Run-off

9.1.2.1 Chemical fertilizers and nutrient run-off changes the pH in streams and ponds and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.1.2.2 Contaminants degrade aquatic and marine water quality and can bioaccumulate in benthic organisms, threatening wildlife by causing developmental and behavioral abnormalities and reproductive failure.

9.1.2.3 Contaminants from road runoff (oil, sediment, salt, etc.) impact native vegetation and the species that rely upon them, degrade water quality in aquatic systems, and can injure or kill the aquatic and semi-aquatic species that rely upon them.

9.3 Agricultural and Forestry Effluents

9.3.1 Nutrient Loads

9.3.1.1 Chemical fertilizers and nutrient run-off changes the pH in streams, ponds and wetlands and causes eutrophication in inland waters and estuaries, which can make habitat unsuitable for specialist species and increase the risk of invasive and generalist species.

9.3.1.2 Animal waste degrades terrestrial and aquatic habitats, especially streams, ponds and wetlands, resulting in eutrophication, which disrupts oxygen and nutrient balances, and causes injury and mortality to aquatic organisms.

9.3.1.3 Organic nutrient inputs from aquaculture may, depending upon type and location, adversely impact intertidal and subtidal habitats and water bodies where there is insufficient tidal flushing.

9.3.1.4 Conversion of low-intensity agriculture to intensive agriculture (e.g., tree nursery, row crop) degrades wetland and aquatic habitats with runoff, increasing sediment and nutrient loads and pH.

9.3.1.5 Conversion of native forests to plantations degrades wetland and aquatic habitats through increased runoff.

9.3.2 Soil Erosion and Sedimentation

9.3.2.1 Soil erosion, sedimentation and destruction of streambanks and riparian buffers degrade waters making them unsuitable for riparian-dependent wildlife.

9.3.2.3 Conversion of native forests to plantations degrades wetland and aquatic habitats through increased sedimentation.

9.3.5 Control of insect pests and plants leading to mortality of non-target species not associated with agriculture

9.3.5.1 Use of pesticides, insecticides, and/or herbicides can directly harm non-target species, such as amphibians and beneficial invertebrates through direct contact and/or by reducing and/or contaminating their food supply.

9.3.5.5 Use of pesticides and herbicides can minimize the abundance of food sources for native wildlife populations.

9.4 Garbage and Solid Waste

9.4.1 Direct hazards to wildlife

9.4.1.2 Garbage and solid waste destroys natural habitats and obstructs wildlife movements.

9.6 Excess Energy

9.6.2 Thermal Pollution

9.6.2.2 Water temperature changes to aquatic systems can deter or preclude use by SGCN (e.g., alter habitat suitability for wildlife species, reduce prey base) or present stressors that are harmful if not fatal to wildlife.

11 Climate Change and Severe Weather

11.2 Droughts

11.2.1 Droughts

11.2.1.1 Contribute to hardened soils, decreasing water recharge during rains and increasing the likelihood of flash floods during storms.

11.2.1.2 Lead to lower groundwater levels and therefore, less available water for people and habitats.

11.2.1.3 Loss, alteration and/or degradation of terrestrial and aquatic habitats.

11.2.1.5 Leads to lower river levels that may impact the ability of anadromous species to reach spawning grounds.

11.3 Temperature Extremes

11.3.1 Temperature extremes

11.3.1.1 Increasing temperatures may cause habitat loss and degradation by desiccating and/or raising the temperatures of small wetlands and streams leading to the loss of freshwater mussels and other aquatic species and species reliant upon these habitats.

11.3.1.2 Increased temperatures can negatively impact wetland, riverine, lacustrine and vernal pool-associated or -dependent wildlife by reducing flows, increasing water temperatures, lowering water levels and causing premature drying of vernal habitats.

11.3.1.3 Temperature extremes of surface water and air degrades marine habitats and ecosystems, threatening marine wildlife. Such extremes also disrupt offshore currents and migratory patterns, species' ranges, and/or impact communities/food chains, all of which further impact the ecosystem.

11.3.1.4 Extremely low temperatures and/or extensive periods of unseasonably low temperatures during critical life history stages (e.g., hibernation, gestation/nesting) can alter animals' behaviors and decrease survivorship.

11.6 Phenology Shifting or Alteration

11.6.2 Phenology shifts related to predator-prey ecology

11.6.2.1 Alters inter-specific relationships (e.g., competition, parasitism, predation) of wildlife, ultimately leads to detrimental impacts on the ecological system.

11.6.2.2 Shifts timing of species migration, breeding and hibernation, and available food resources, causes redistribution of species, or mortality for species that are unable to relocate due to their already isolated habitat or limited mobility.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory

12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.2 Lack of up-to-date existing information

12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms

12.3.0.2 Delays between State species status reviews and regulation amendments to incorporate the findings leads to extended periods when imperiled species do not receive the benefit of land use and other regulatory protections.

12.3.0.4 The NJ Administrative Code (N.J.A.C.) fails to protect native, freshwater fish species from collection and/or their use as bait.

12.3.0.5 NJDEP land use regulations provide no protection for spawning habitats of native, freshwater fish that are identified as candidates for State endangered, threatened, or special concern status.

12.3.0.7 Activities that threaten SGCN, their food sources, and/or habitats are often regulated separately and without consideration for the cumulative and synergistic effects over time or over a larger spatial scale. Therefore, regulations can fail to protect SGCN populations over time.

12.3.0.8 Lack of stable funding to support State marine fisheries research, monitoring, and management is a significant impediment to biologically-based management of fish and shellfish populations in New Jersey, which can result in overharvest and severe population declines.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform

12.4.0.1 A species-by-species management focus as opposed to ecological systems and biodiversity generally has greater opportunity for unintended consequences for other species and may be less efficient in developing appropriate management actions.

12.4.0.2 Policies and procedures for lands management that lack consideration of the impacts of activity timing can result in unintended impacts to wildlife during vulnerable periods.

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats

14.1.1.3 Lack of understanding of the need to manage both natural and anthropogenic (e.g., yards, lawnscapes, hayfields, etc.) habitats to minimize impacts or increase benefits to SGCN and their habitats.

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions

14.2.1.2 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various aquatic and riparian management practices.

14.2.1.3 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various coastal management practices.

14.2.1.4 Need to develop greater understanding of and support for efforts implemented to maintain disturbance-free habitats that allow coastal wildlife populations to thrive alongside human residential and recreational uses.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

2 Direct Management of Natural Resources

2.2 Dam and barrier removal

2.2.1 Culvert work

2.2.1.1 Replace existing barriers to wildlife movement with and/or install appropriately-sized systems to accommodate wildlife dispersal.

2.2.5 Obstruction removal

2.2.5.1 Enhance fish SGCN habitats by removing obstructions to fish passage to benefit those species.

2.8 Invasive species control

2.8.0 Invasive species control strategies and implementation

2.8.0.2 Develop, implement, monitor and evaluate pest control/management strategies to reduce the impacts of over-abundant wildlife species (native and/or native, invasive species) on native vegetation and the degradation of habitats supporting SGCN. Over-abundant wildlife species include but are not limited to mute swans, Canada geese, beaver and white-tailed deer.

2.8.0.3 Work with NJ Invasive Species Strike Team to identify areas with and eradicate aquatic invasive species such as the Asian Swamp Eel, Northern Snakehead, and the Chinese pond mussel. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.4 Implement control/management strategies to reduce the impacts and/or limit the distribution of invasive, native and non-native species (wildlife and plants) that pose threats to native wildlife or communities. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical. Follow BMPs to maximize the effectiveness of the strategies while avoiding excessive harm to non-target species.

2.8.0.5 Implement biologically safe and appropriate control/management strategies, and where appropriate, eradication strategies to reduce the impacts and/or limit the distribution of invasive and/or non-native plant species within or near aquatic systems using methods that will provide the most protection to the aquatic and riparian ecological system, and minimize disturbance to the soil and wildlife. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.8.0.6 Implement long-term management of invasive and/or non-native plants to help maintain functioning ecological systems and biological diversity, and to enhance travel corridors. Encourage the implementation of biological and mechanical removal/control. When chemical control is used, encourage low-volume, targeted application using NJDEP-approved chemicals in accordance with the specific instructions for that chemical.

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.1 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas to improve ecological diversity.

2.11.0.2 Conduct vegetation management in native terrestrial and aquatic habitats to provide suitable and appropriately sized areas for target SGCN and/or species groups; management should complement rare species needs in a targeted area.

2.11.0.4 Implement vegetation management strategies that consider appropriate timing to avoid sensitive periods (e.g., nesting, denning, roosting) and minimize harm to wildlife, particularly SGCN.

2.11.0.5 Expand the acreages and enhance the effective size of SGCN habitats by restoring adjacent, less optimal or unsuitable, habitats through vegetation management.

2.11.0.7 Protect significant natural and/or unique communities by implementing best management practices through vegetation management.

2.11.0.8 Maintain, enhance and/or restore biologically appropriate buffers for SGCN-inhabited/used freshwater wetlands through vegetation management.

2.11.0.13 Implement best management practices (BMPs), protective strategies, and guidelines for vegetation management to maintain and enhance healthy, SGCN-associated habitats while minimizing (if not avoiding) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

2.11.0.15 Implement vegetation management to benefit urban-associated SGCN.

2.11.0.18 Implement forest management/silvicultural strategies that promote the development of new old-growth forests and/or minimize the loss of old-growth forest stands with large trees and within large, contiguous tracts.

2.11.0.21 Minimize the degradation, alteration and/or changes in hydrology of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and subsequent disturbances to and behavioral changes of wildlife by maintaining or enhancing these areas and biologically appropriate buffers through habitat management and/or revegetation or restoration efforts.

2.11.0.22 Minimize habitat loss of high and low marsh habitats that provide nesting, migrating and wintering areas for SGCN birds and other marsh-dependent SGCN by maintaining or enhancing these areas through habitat management and/or revegetation or restoration efforts.

2.11.0.24 Conduct vegetation management adjacent to aquatic habitats following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.27 Conduct vegetation management for target shrub- or young forest-dependent SGCN following BMPs to minimize the risk of the establishment of invasive and non-native plants.

2.11.0.28 Conduct vegetation management in agricultural areas following BMPs to enhance habitat for target shrub- or young forest-dependent SGCN while minimizing negative impacts to other SGCN.

2.11.0.33 Increase structural habitat diversity by implementing long-term vegetation management to minimize the potential for the establishment of invasive and/or non-native plants that may outcompete native vegetation.

2.11.0.34 Increase structural habitat diversity by managing residential, commercial and recreational areas' landscapes for a variety of species. For example, integrate short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas and no-mow set-asides.

2.11.0.35 Increase structural habitat diversity by managing vegetation adjacent to aquatic habitats in a manner that provides a buffer from runoff and erosion and a microclimate to stabilize seasonal temperatures to benefit a variety of aquatic and semi-aquatic species.

2.11.0.36 Increase structural habitat diversity by managing vegetation for a variety of species and considering their life history requirements (e.g., travel corridors, shelter, resting and breeding areas) to minimize the risk of harm.

2.11.0.37 Increase structural habitat diversity by minimizing the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats which benefits wildlife.

2.11.0.38 Increase structural habitat diversity in and around horse/livestock farms by managing vegetation for a variety of species, in particular, in and around farms that have fragmented forests, and by implementing ecologically best practices (e.g., do not permit overgrazing, do not allow livestock to wade in waterbodies).

2.11.0.44 Manage phragmites adjacent to coastal marshes of interest, in particular those that are within underdeveloped areas and are unprotected, through herbicide application and water management to improve resiliency of the marshes to sea level rise.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.4 Conduct long-term studies on SGCN inhabiting permanently protected natural lands to develop population trend data and changes in demography, and to determine if critical and/or supporting habitats are limited or changing; i.e., diminishing in value, acreage or connectivity.

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.6 Conduct long-term studies on resident and migratory SGCN to determine if there are changes to the populations' demography (productivity, survival, dispersal) and/or to their critical and/or supporting habitats (i.e., diminishing in value, acreage or connectivity, etc.), in particular changes that would not maintain SGCN at viable levels for species populations. Update data and GIS maps; provide updated information to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.7 Collect baseline data to document species distributions, in particular SGCN, and current habitat for future analysis of possible distribution shifting as a result of habitat shifting or alteration associated with climate change impacts.

3.0.0.8 Conduct long-term studies and compare baseline metrics of documented species distributions and associated habitats to identify possible species and/or habitat shifting or alteration associated with climate change impacts.

3.0.0.11 Develop, implement and evaluate the effectiveness of town plans that avoid impacts to SGCN species and their habitats.

3.0.0.12 Compile available life history information on urban-associated SGCN (e.g., predators, levels of nest/young depredation, breeding longevity and reproductive effort over time, preferred nesting/reproductive requirements, fidelity to breeding and wintering sites, comprehensive assessment of migration routes and destinations) for future development of management strategies to benefit such species.

3.0.0.13 Investigate the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats. Evaluate and modify management practices as appropriate.

3.0.0.14 Identify areas with invasive, aquatic plants and animals and collect a detailed baseline assessment of the species' status and distribution. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort. Researchers and contractors performing Forest Stewardship Inventories and/or Plans on state lands should report invasive plant species through the New Jersey Invasive Species Strike Team phone application.

3.0.0.15 Conduct long-term monitoring of areas identified as having invasive, aquatic plants and animals to track the species' status/progress over time with or without the implementation of management strategies. Areas without management strategies should be assessed and prioritized for management/control. Areas where management strategies are being implemented should include an assessment of the management effort and identify/recommend and implement necessary changes to improve its success. Solicit volunteers from organizations such as the New Jersey Invasive Species Strike Team to support this effort.

3.0.0.19 Identify the presence and status (e.g., functioning, structure, slated for removal, etc.) of existing dams and culverts within and/or that may impact SGCN and their habitats, and create a database that includes a GIS component identifying the locations of such structures and their status. Share this information with appropriate organizations and/or agencies evaluating the benefits and risks of such structures on SGCN and their habitats.

3.0.0.20 Once baseline data identifying and describing the status of existing dams and culverts have been gathered, conduct evaluations at a variety of sites to determine whether the benefits of culvert and dam creation or removal outweigh the risks to SGCN species and their habitats, and if other variables/conditions specific to individual sites/locations result in a different outcome. Identify and target appropriate dams and culverts for removal and/or reconstruction to minimize harm to SGCN species and their habitats.

3.0.0.21 Conduct long-term monitoring to determine the impacts of the fish and shellfish aquaculture industries on focal and non-focal SGCN and their habitats (i.e., NJ bays, estuaries, ocean areas). Assess the success of management actions implemented to minimize these impacts and make specific recommendations to the NJ DEP regarding how such management efforts may be improved to minimize harm to wildlife and their habitats.

3.0.0.22 Develop, implement and evaluate the success of a habitat improvement and restoration program to restore cold-water fish habitat, ecosystems and populations.

3.0.0.23 Identify (through wildlife and aquatic system surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and research water quality parameters for all [types of] aquatic systems for various SGCN populations.

3.0.0.26 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species including objectives and guidance pertaining to and the condition/status of critical and supporting habitats.

3.0.0.27 Evaluate the effectiveness of strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals through research and monitoring. Develop and provide NJ DEP and other appropriate governing agencies/commissions a summary of findings and recommendations to improve such efforts.

3.0.0.28 Evaluate best management practices for using mined sand or dredged material to improve habitat for wildlife, particularly for spawning horseshoe crabs and migrating shorebirds.

3.0.0.29 Conduct long-term monitoring of sensitive marine species habitats and migration and/or spawning areas to determine their continued use or changes as a result of habitat shifts or alterations that may warrant further management actions.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.1 Division of Fish and Wildlife should maintain a robust, up-to-date database and mapping of species occurrences.

3.2.0.2 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.0.3 Survey for and monitor populations of freshwater aquatic focal SGCN to assess the populations' demography, trends, condition, distribution, etc.

3.2.0.4 Conduct long-term monitoring of the impacts of contaminants to vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.2.0.5 Prevent or ameliorate near-term impacts of climate change throughout the State by developing, implementing and monitoring/evaluating habitat management strategies that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas, in particular within the coastal and Delaware Bay areas.

3.2.0.6 Develop, implement and conduct studies to evaluate the effectiveness of methods implemented to reduce road mortality of wildlife (e.g. wildlife underpasses, road closures).

3.2.0.7 Track (via a database that includes a GIS component) and research problematic species and diseases to determine their distribution, impacts on SGCN wildlife/wildlife communities, and develop potential control measures.

3.2.0.8 Implement and conduct long-term monitoring of control measures aimed at minimizing the impacts of problematic species and/or diseases to evaluate the effectiveness of such efforts and to identify and incorporate additional strategies as appropriate.

3.2.0.10 Evaluate the effectiveness of sanitation/decontamination protocols in minimizing the transference of wildlife diseases and invasive plant species.

3.2.0.13 Continue the research and studies undertaken by the State's Shad and River Herring/Alewife Technical Working Group regarding an assessment to determine if the herring should be listed as a "stock in the fishery."

3.2.0.14 Identify spawning areas for species such as Atlantic and Shortnose sturgeon, Alewife, and Blueback Herring, and document shifts of these areas over time. Assess their reproductive success over time, including fecundity, early life stages and juvenile success, etc.

3.2.0.15 Identify and compile information regarding critical time periods in which freshwater SGCN fish are vulnerable (e.g., spawning periods) using literature searches, review of available data, enlistment of species experts, etc.).

3.2.0.16 Conduct long-term monitoring to evaluate the success of marine conservation zone designations on marine SGCN.

3.2.0.18 Conduct baseline surveys/inventories to better understand the distribution of fish and invertebrate (including freshwater mussels) populations.

3.2.0.21 Investigate the effects of mosquito control methods on freshwater aquatic and semi-aquatic SGCN including but not limited to, amphibian, fish, dragonfly, and damselfly populations.

3.2.7 Population assessment

3.2.7.1 Conduct species status assessments using the Delphi Technique and review of available data and literature on fish and wildlife (including marine animals) to maintain accurate legal status categorization of native wildlife.

3.2.7.2 Conduct studies to evaluate the effectiveness of proactive species recovery plans for all endangered and threatened species to meet and maintain recovery goals.

3.5 Techniques development

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.2 Develop, implement, monitor and evaluate management strategies to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

3.5.4.4 Investigate the effects of mosquito control methods on freshwater aquatic and semi-aquatic SGCN including but not limited to, amphibian, fish, dragonfly, and damselfly populations.

3.5.4.5 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

3.5.4.6 Investigate the feasibility of mitigating for the impacts of contaminants to vulnerable wildlife, particularly SGCN. Maintain records on exposure of vulnerable wildlife to environmental toxins (such as flame retardants and endocrine disruptors), so that sources may be identified and controlled or eliminated.

3.5.4.8 Develop a habitat improvement and restoration program to restore cold-water fish ecosystems and populations.

3.5.4.11 Develop aquaculture practices in the Delaware Bay that are compatible with the recovery of SGCN.

3.5.4.13 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

3.5.4.14 Develop and implement agreements, and update existing agreements, with government agencies regarding the protection of critical SGCN habitats (e.g., significant breeding populations of beach nesting birds, colonial waterbird nesting areas, bat colonies, etc.).

3.5.4.15 Investigate the success of management strategies used to protect and/or enhance SGCN populations and when appropriate, aid in identifying failures/resource problems and issues, and developing new strategies.

3.5.4.16 Use data regarding SGCN population numbers/trends and demography, on-going threats, habitat changes, etc. to determine if directed management efforts are needed to reach or maintain viable population levels and develop the necessary management strategies.

3.5.4.17 Investigate new, non-invasive techniques for SGCN population evaluation through literature review, expert opinion, trial studies (if low risk), etc.

3.5.4.18 Investigate the effectiveness of survey techniques through selected “ground truthing” and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data.

3.5.4.19 Develop reliable, standardized survey and monitoring protocols for SGCN species, for which none currently exist, and their habitats.

3.5.4.23 Reduce the impacts of entrainment, impingement and thermal discharge at power plants by working with conservation partners, academia, etc. to ensure that best available technologies are utilized wherever possible.

6 Land and Water Rights Acquisition and Protection

6.0 Acquisition and protection strategies

6.0.0 Combined acquisition and protection strategies

6.0.0.3 Secure and protect riparian and floodplain habitats, inland wetland habitats (marsh, vernal pool, fen, emergent shrubland, forest), and other aquatic habitats (including open waters) and/or biologically appropriate buffers to minimize degradation through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.4 Secure and protect fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.5 Secure and protect critical coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating and wintering areas for SGCN birds, fish and other coastal SGCN through an appropriate combination of fee title, non-fee title and landowner agreements.

6.0.0.6 Secure and protect old-growth forest stands with large trees and/or stands that are approaching or being actively managed for old growth forests, in particular those within large, contiguous forest tracts, through an appropriate combination of fee title, non-fee title and landowner agreements.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.3 Develop an outreach team of personnel from government entities, conservation organizations and other stakeholders to work together to collaboratively use social media campaigns to grow a constituency of NJ residents who have an elevated ecological and climate consciousness.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.1 Utilize WSFR grant funds, in combination with alternate funding sources as needed, to implement a scientific data-driven, extensive educational/outreach program targeting sportsmen's organizations and fisheries, as well as public constituents, addressing the potential impacts of over-harvesting wildlife can have on the ecological system and to promote "sustainable harvest".

9 Planning

9.1 Land use planning

9.1.0 Land use planning strategies

9.1.0.1 Develop smart-growth plans and critical habitat designations that consider SGCN life history requirements and habitat needs, connectivity and health of those habitats, and minimizes human-associated disturbances to those habitats and the SGCN inhabiting them.

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.1 Develop a management plan specific to River Herring/Alewife to ensure a sustainable population in perpetuity.

9.3.1.3 Develop a management plan to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals.

9.3.1.4 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.1.7 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.1.9 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.1.12 Develop a management plan to benefit urban-associated SGCN based on research.

9.3.1.13 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.1.14 Create species management plans that will promote the protection and where appropriate, the development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

9.3.1.19 Develop management strategies for freshwater SGCN fish and incorporate them into existing Freshwater Fisheries Management Plans.

9.3.1.20 Use compiled life history information on urban-associated SGCN regarding threats, breeding, fecundity, survival, habitat needs, wintering sites/roosts, migration routes and destinations, etc. to develop wildlife management strategies to benefit such species.

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

9.3.3 Habitat management planning

9.3.3.6 Develop a management plan for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

9.3.3.7 Develop a management plan to reduce the impacts of herbivory on native vegetation and the degradation of habitats supporting SGCN by invasive and/or native, over-abundant wildlife species including but not limited to mute swans, Canada geese, beaver and white-tailed deer.

9.3.3.10 Develop a management plan to ensure SGCN populations' persistence based on long-term monitoring of resident and migratory SGCN populations and their habitats.

9.3.3.11 Develop town plans that avoid impacts to SGCN species and their habitats.

9.3.3.13 Develop a management plan that will establish/improve habitat resilience (e.g., shorelines of the coast and Delaware Bay, forested habitats of the Pinelands and Skylands) that benefits wildlife inhabiting these areas and prevents or ameliorates near-term impacts of climate change throughout the State, but in particular within the coastal and Delaware Bay areas.

9.3.3.14 Develop a management plan using aquaculture practices in coastal areas that are compatible with the recovery of SGCN.

9.3.3.15 Develop a management plan incorporating the effects of pesticides, herbicides and other biological controls on SGCN and their critical and supporting habitats.

9.3.3.18 In cooperation with species and habitat experts, develop management plans for significant natural and/or unique communities, in particular those supporting SGCN, and provide the information to the landowners/managers (federal, state and local government agencies or non-government organization) for review and implementation.

9.3.3.19 Develop management plans for SGCN inhabiting permanently protected natural lands using available baseline and population trend data.

9.3.3.21 Develop a rapid response plan for various scenarios (e.g., insect infestations destroying native habitat, wildlife disease) to be implemented upon exotic pathogen introduction or incident.

9.3.3.22 Create management plans to minimize and/or prevent wildlife road mortality that will incorporate wildlife passages in conjunction with barrier fencing and, where possible, seasonal closures. Aquatic-associated passages must avoid disturbance to the natural streambeds and riparian habitat, permit high volumes of water to flow freely, and provide adequate travel corridors for terrestrial wildlife, while maintaining stream flow for fish passage. Bridges that span rivers and streambeds and include floodplain habitat on either side of the span to provide travel corridors for terrestrial wildlife are preferred over culverts.

9.3.3.23 Create forest management plans that will promote the protection and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

9.3.3.24 Develop a plan to improve the enforcement of policies and/or regulations that protect wetlands, riparian and floodplain areas, and aquatic habitats (including open waters).

9.3.3.25 Develop a habitat management plan focused on areas important to near-shore, coastal species (e.g., herring, sturgeon, terrapin, nesting birds) that prioritizes these areas to direct resources to minimize the impacts of sea-level rise, flooding and storms (including extreme rain events) such as increased erosion of beach, mudflat and marsh habitats, and the increased risk of saltwater intrusion into freshwater habitats. Gather "best information" for spatial modeling of anticipated habitat shifts from sea-level rise, flooding, etc.

9.3.3.35 Incorporate habitat connectivity, preservation of natural areas, and the implementation of BMPs into state and local land-use policy environmental review process and energy development plans to minimize habitat fragmentation and related threats associated with solar farms and altered habitats.

9.3.3.36 Integrate plans for properly located and timed habitat restoration and management along transportation, energy and service corridors to minimize risks to and benefit wildlife.

9.3.3.37 Develop management strategies for freshwater SGCN fish and incorporate them into existing Freshwater Fisheries Management Plans.

9.3.3.38 Use compiled life history information on urban-associated SGCN regarding threats, breeding, fecundity, survival, habitat needs, wintering sites/roosts, migration routes and destinations, etc. to develop habitat management strategies to benefit such species.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

100 Law and Policy

100.1 Legislation

100.1.4 County and Local

100.1.4.4 Secure wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) and biologically appropriate buffers through local ordinances.

100.1.4.5 Secure SGCN-inhabited/used freshwater wetlands and biologically appropriate buffers through local ordinances.

100.1.4.6 Secure fish SGCN habitats by protecting lands adjacent to fish SGCN habitats and/or aquatic systems feeding into such habitats through local ordinances.

100.3 State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.1 Develop (and/or improve) policies and/or regulations that will promote the reduction of run-off and point and non-point source pollution into NJ's aquatic systems (streams, rivers, lakes/ponds, bays, ocean, wetlands, etc.).

100.3.0.4 Promote policies and regulations that support marine conservation zone designations in suitable areas identified through research and literature.

100.3.0.5 Develop policies that will promote improved and secure habitat connections between conserved SGCN habitats.

100.3.0.6 Develop policies that will promote expanding acreages and enhancing the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.7 Amend current policies and/or regulations to increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

100.3.0.8 Develop policies and/or regulations with the objective of protecting significant natural and/or unique communities in perpetuity.

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.11 Develop policies that will ensure the protection and/or development of old-growth forest stands with large trees, in particular those within large, contiguous forest tracts.

100.3.0.13 Develop policies that will promote protecting and restoring riparian areas.

100.3.0.14 Develop policies and/or regulations that increase the protective buffers of wetlands, riparian and floodplain areas, and aquatic habitats (including open waters) to biologically appropriate distances to benefit SGCN that rely upon these habitats and improve the function of the [associated] aquatic systems.

100.3.0.18 Develop policies for conserved lands that prohibit planting and supports the control of non-native vegetation and invasive, native vegetation.

100.3.0.21 Develop policies that minimize wildlife road mortality through: 1) Requiring the integration of wildlife passages into all new and repaired roads, in particular those areas that will connect SGCN habitats, 2) Requiring current fish/wildlife passages be improved and maintained in perpetuity, 3) Supporting seasonal road closures, in particular for unimproved roads, 4) Supporting projects that work to improve connectivity of SGCN habitats such as land conservation through acquisition or other means.

100.3.0.23 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.25 Amend the harvest quota or "bag limits" within the freshwater fish code relative to SGCN or sensitive game species' as needed.

100.3.0.26 Adopt regulations requiring the combined sewer overflow alternative analyses required by regulation address potential impacts to wildlife in watercourses or receiving water bodies.

100.3.0.31 Create or expand tax-based incentive programs available to private, agricultural, commercial, industrial or governmental landowners and land managers to include or provide for incentives for the maintenance and/or improvement to existing habitat via the endorsement of wildlife-related BMPs.

100.3.0.32 Coordinate regulations across agencies to maximize availability of and enrollment in existing Forestry Stewardship Programs (e.g., "Woodland Stewards", Farm Bill, partners, etc.) to maintain and/or improve forest habitat.

100.3.0.33 Adopt additional timing restrictions, and any necessary permit conditions, into the Administrative Code for NJ DEP-permitted projects to minimize impacts on freshwater SGCN fish, in particular, within habitats during their vulnerable periods as identified through a thorough review of available information.

100.3.0.35 Incorporate Freshwater Fish Status Assessment (Delphi Technique) results pertaining to endangered and threatened species into regulations.

100.3.0.37 Develop a law and/or policy that requires NJ DEP to continue to address and correct the allowable combined sewer overflow inputs of solid waste into the marine environment to minimize harm to wildlife and their habitats.

100.3.0.38 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.3.0.39 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.3.0.40 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.3.0.41 Explore all State regulatory requirements for mitigation, restoration, habitat management, etc. to ensure they prohibit the use of specified invasive or other problematic plant species.

100.3.0.42 Fully adopt the former Storm water Management Rules' 300ft buffer requirements into the Flood Hazard Area Control Act Rules.

100.3.0.46 Investigate and/or develop inter-agency Memorandum of Agreements to share common data stored or managed in program-specific databases.

100.3.0.47 Investigate regulatory options available to direct the location of aquaculture activities in Aquaculture Development Zone 4 (Delaware Bay area) in a manner which minimizes the loss of wildlife habitats and adverse impacts to the environment.

100.3.0.48 Propose new State law or regulation mandating that a State-level "development impact fee" be assessed on all new development approved by municipalities (via the Municipal Land Use Law processes), and dedicate such monies to the development and implementation of regional Habitat Conservation Plans (or existing plans/programs serving the same regional function).

100.3.0.49 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address the issue of disturbance to habitat or species as a result of human activities (e.g., construction, bridge maintenance, road work, etc.).

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.3.0.53 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded rights-of-way corridors associated with energy transport/transmission.

100.3.0.54 Revise existing and/or incorporate new State land use regulations that specifically address the impacts of new or expanded surface mining areas.

100.3.0.55 Develop regulations to address potentially adverse effects of aquaculture on SGCN species and their habitats.

100.3.0.57 Develop regulations that when implemented will improve and secure habitat connections between conserved SGCN habitats.

100.3.0.58 Develop regulations that when implemented will promote the expansion of acreages and enhancement of the effective size of SGCN habitats by providing biologically appropriate buffers of native habitat surrounding SGCN habitats.

100.3.0.59 Develop regulations that when implemented will increase the ability to protect and preserve coastal habitats (beach/dune, scrub-shrub, forest, wetland, marsh, and marine and estuarine habitats) that provide nesting, migrating, and wintering areas for SGCN birds, fish and other coastal and aquatic SGCN.

100.3.0.60 Develop regulations that when implemented will protect significant natural and/or unique communities in perpetuity.

100.3.0.62 Develop regulations that when implemented will protect existing old-growth forest stands with large trees and/or stands that are being actively managed for old growth forests, in particular those within large, contiguous forest tracts.

100.3.0.64 Develop regulations that when implemented will protect and restore riparian areas.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100.3.0.73 Develop regulations that would exempt the conversion of lawns to native vegetation (beneficial to wildlife) from local lawn ordinances.

100.4 State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.1 Create any necessary policy changes (including those to incentive programs) to encourage the integration of SWAP actions associated with SGCN priority habitats as a deliberative factor in agencies' actions (e.g., environmental and land management review processes, land acquisition and management).

100.4.0.3 Develop policies for mandatory buffer strips on preserved farmlands and state-owned agricultural lands.

100.4.0.4 Create a policy that requires the use of wildlife habitat and corridor mapping products for both regulatory use when conducting project reviews and planning/siting new or expanded rights-of-way projects.

100.4.0.7 Develop a law and/or policy that requires NJ DEP to continue to address and correct the allowable combined sewer overflow inputs of solid waste into the marine environment to minimize harm to wildlife and their habitats.

100.4.0.9 Develop and implement policies to minimize the removal of coarse, woody debris in terrestrial, aquatic and riparian habitats in order to benefit wildlife.

100.4.0.10 Develop laws and/or policies to ensure appropriate and obligated financial compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the disturbance of subtidal shallows and/or impacts to habitat and water quality from pollution.

100.4.0.11 Develop laws and/or policies to ensure appropriate financial and obligated compensation to NJDEP's Office of Natural Resource Restoration (and similar groups) for the purpose of marine habitat enhancement and wildlife research, and mitigation efforts address the impacts of invasive, non-native aquatic plant species establishing themselves or thriving as a result of illegal actions.

100.4.0.12 Develop laws and/or policies to require vegetative buffers of native plants on preserved farmland and state lands with agricultural leases or agreements.

100.4.0.13 Develop policies for different circumstances (e.g., roadsides and medians, riparian, aquatic and terrestrial habitats) that outline appropriate habitat/vegetation management strategies and schedules to minimize risks to and benefit wildlife.

100.4.0.16 Develop policies to implement habitat management strategies that will increase the structural diversity surrounding areas used for energy, mining, and transportation and service corridors which include but are not limited to the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides.

100.4.0.18 Develop policies to minimize the extent of infrastructure associated with energy and service corridors or areas (e.g., wind and solar farms, pipelines, utility lines) and that require the implementation of habitat management strategies that will increase the structural diversity in the area including (e.g., the presence of short and tall grasses, specific host plants, brush piles, water sources/wetlands, shrubby areas, nesting areas, and no-mow set-asides).

100.4.0.19 Develop regulations that will minimize the creation of new barriers, remove or replace current barriers with appropriately-sized systems to accommodate wildlife dispersal, and to minimize road widening and traffic volume increases within critical wildlife habitat areas.

100.4.0.20 Develop state regulations that require energy developers and utility service companies to implement habitat management strategies that will increase the structural diversity of the habitat, minimize habitat fragmentation and commercial infrastructure, and minimize the loss, alteration and/or degradation of the habitat and adjacent lands when working on preserved farmlands, state-owned agricultural lands, forests, parks and wildlife management areas, and any conserved lands purchased with the assistance of Green Acres and Federal Land & Water Conservation Fund monies.

100.4.0.21 Ensure that Section 303(d) of the Clean Water Act and applicable State statutory/regulatory requirements for surface water pollutant budgets are being met by monitoring and enforcing regulatory Total Maximum Daily Load (TMDL) targets established within regional Water Quality Management Plans.

100.4.0.22 Work with NJ DEP's Division of Land Use Regulation to ensure protection of listed species and their habitats during stream cleaning events.

100.4.0.23 Adopt additional timing restrictions, and any necessary permit conditions, into the Administrative Code for NJ DEP-permitted projects to minimize impacts on freshwater SGCN fish, in particular, within habitats during their vulnerable periods as identified through a thorough review of available information.

100.4.0.24 Develop policies to provide financial support for the New Jersey Invasive Species Strike Team.

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Project 26. Pollutants Come in Many Forms

Job 26.01. Oil Spills within Sensitive Wildlife Habitat

Objective: Identify and develop electronic mapping of sensitive wildlife areas to share with appropriate response organizations and agencies to help prioritize the oil spill response efforts.

Purpose: Minimize harm to wildlife impacted by oil spills by improving the oil spill response time.

Benefits: Reduce threat risk to wildlife species from oil spills.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	Black Skimmer	Common Tern
Forster's Tern	Least Tern	Little Blue Heron
Piping Plover	Red Knot	Ruddy Turnstone
Snowy Egret	Tricolored Heron	

Fish

Alewife	Atlantic Sturgeon	Blueback Herring
Shortnose Sturgeon		

Macroinvertebrates

A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper
Ashton Cuckoo Bumble Bee	Brook Floater	Buchholz's Dart Moth
Buchholz's Gray	Carter's Noctuid Moth	Daecke's Pyralid Moth
Dotted Skipper	Dwarf Wedgemussel	Eastern Lampmussel
Frosted Elfin	Georgia Satyr	Green Floater
Hoary Elfin	Leonard's Skipper	Little White Tiger Beetle
Maritime Sunflower Borer Moth	New England Bluet	New Jersey Pine Barrens Tiger Beetle
Northeastern Beach Tiger Beetle	Northern Metalmark	Papaipema harrisii
Pine Barrens Bluet	Pink Sallow	Robust Baskettail
Rusty Patched Bumble Bee	Sand Myrtle Looper/Pink	Scarlet Bluet
Septima's Clubtail	Southeastern Beach Tiger Beetle	Southern Plains Bumble Bee
Superb Jewelwing	Triangle Floater	Variable Cuckoo Bumble Bee
Yellow Bumble Bee	Yellow Lampmussel	Yellow-banded Bumble Bee

Mammals

North Atlantic Right Whale

Reptiles & Amphibians

Atlantic Green Turtle	Atlantic Leatherback	Atlantic Loggerhead
Atlantic Ridley	Northern Diamondback Terrapin	

Threats and Action Drivers associated with this conservation need

3 Energy Production and Mining

3.1 Oil and Gas Facilities and Pipelines

3.1.1 Distribution processes of petroleum and other liquid hydrocarbons

3.1.1.3 Increased risk of oil spills.

9 Pollution

9.2 Industrial and Military Effluents

9.2.1 Oil Spills

9.2.1.1 Oil spills render resting, breeding and foraging habitats temporarily unavailable to wildlife, altering normal wildlife behavior.

9.2.1.2 Oil spills have long term effects on habitats and damage ecological processes that can cause local wildlife population declines and impaired foraging or reproduction.

9.2.1.3 Oil spills cause external oiling of wildlife and ingestion of oil, both of which can injure or kill wildlife.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory

12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.3 Baseline inventory

3.2.3.1 Identify the distribution of whales (particularly right whale) during seasonal migrations. Methods include but are not limited to: a) Conduct surveys in shipping lane vicinities and along the coast during whale migration to determine the seasonal distribution, b) Develop a predictive GIS model (based on available species occurrence information and habitat data) to predict right whale migration routes off the NJ coast, and c) Identify whale distribution and right whale migration routes through the participation in the East Coast's Sightings Advisory System for mariners.

3.2.3.2 Identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) suitable areas for marine conservation zone designation and promote policies and regulations that support the designation of such areas.

3.3 Research, survey or monitoring - habitat

3.3.2 Monitoring

3.3.2.23 Conduct long-term monitoring of marine submerged aquatic vegetation and update the Marine Submerged Aquatic Vegetation Mapping [to be developed under baseline activities] to provide the NJ DEP's coastal regulatory programs with the most current data.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.27 Conduct an assessment and develop a location list of available equipment for boom deployment during oil spills.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.2 Develop a team of personnel from government entities, conservation organizations and other stakeholders engaged in oil/gas spill response for marine and freshwater habitats to develop a feasible plan for oil spill response and/or to amend NJ's current oil spill response plan that clearly outlines each organizations responsibilities and an assessment and location list of available equipment for boom deployment during oil spills.

8.1.0.6 Engage government agencies, conservation partners and other stakeholders in discussions focused on sharing information regarding coastal and marine critical wildlife habitats, developing comprehensive mapping to assist in reducing impacts of energy production activities, and establishing a long-term monitoring program to update the data. Ensure this information is available to appropriate personnel for planning or response measures.

8.1.0.7 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting coastal boating and recreation communities about eelgrass/widgeongrass, their impacts on marine environments, and the value, fragility and location of submerged aquatic vegetation beds and habitats.

8.1.0.31 Encourage government agencies, conservation partners and other stakeholders to work together to create GIS mapping for marine wildlife and habitat to assist in reducing impacts of energy production activities. Ensure this information is available to appropriate personnel for planning or response measures.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.15 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

9.3.3 Habitat management planning

9.3.3.28 Develop a plan to minimize the impacts of oil spills on wildlife and their habitats.

Job 26.02. Herbicides, Pesticides, and Wildlife

Objective: Create and provide tools, such as educational materials and incentives, to encourage the agricultural industry, forest managers, developers, and homeowners to implement more targeted use of herbicides and pesticides when such products are necessary and to employ buffer strips, settling basins, and other protections against runoff and over-spraying. Engage with pesticide and herbicide manufacturers to encourage refinement of their products and labels as warranted.

Purpose: Minimize the impacts of herbicides and pesticides on non-target flora and fauna.

Benefits: Reduce the risk of direct impacts to non-target wildlife as well as any secondary or cumulative effects caused by herbicides and pesticides in the environment and food chain.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	American Woodcock	Black Rail
Black Skimmer	Blue-winged Warbler	Bobolink
Cerulean Warbler	Common Tern	Eastern Meadowlark
Forster's Tern	Golden-winged Warbler	Grasshopper Sparrow
Kentucky Warbler	Least Tern	Little Blue Heron
Northern Bobwhite	Northern Harrier	Peregrine Falcon
Pied-billed Grebe	Piping Plover	Prothonotary Warbler
Red Knot	Red-headed Woodpecker	Ruddy Turnstone
Scarlet Tanager	Snowy Egret	Tricolored Heron
Vesper Sparrow	Wood Thrush	

Fish

Alewife	Atlantic Sturgeon	Banded Sunfish
Blackbanded Sunfish	Blueback Herring	Bridle Shiner
Brook Trout	Comely Shiner	Ironcolor Shiner
Mud Sunfish	Shortnose Sturgeon	Swamp Darter

Macroinvertebrates

A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper
Ashton Cuckoo Bumble Bee	Brook Floater	Buchholz's Dart Moth
Buchholz's Gray	Carter's Noctuid Moth	Daecke's Pyralid Moth
Dotted Skipper	Dwarf Wedgemussel	Eastern Lampmussel
Frosted Elfin	Georgia Satyr	Green Floater

Hoary Elfin	Leonard's Skipper	Little White Tiger Beetle
Maritime Sunflower Borer Moth	New England Bluet	New Jersey Pine Barrens Tiger Beetle
Northeastern Beach Tiger Beetle	Northern Metalmark	Papaipema harrisii
Pine Barrens Bluet	Pink Sallow	Robust Baskettail
Rusty Patched Bumble Bee	Sand Myrtle Looper/Pink	Scarlet Bluet
Septima's Clubtail	Southeastern Beach Tiger Beetle	Southern Plains Bumble Bee
Superb Jewelwing	Triangle Floater	Variable Cuckoo Bumble Bee
Yellow Bumble Bee	Yellow Lampmussel	Yellow-banded Bumble Bee

Mammals

Allegheny Woodrat	Indiana Bat	Little Brown Bat
North Atlantic Right Whale	Northern Myotis	

Reptiles & Amphibians

Atlantic Green Turtle	Atlantic Leatherback	Atlantic Loggerhead
Atlantic Ridley	Bog Turtle	Carpenter Frog
Corn Snake	Eastern Box Turtle	Eastern Hognose Snake
Eastern Redbelly Turtle	Eastern Spadefoot	Eastern Tiger Salamander
Longtail Salamander	New Jersey Chorus Frog	Northern Black Racer
Northern Diamondback Terrapin	Northern Pine Snake	Northern Red Salamander
Northern Scarlet Snake	Pine Barrens Treefrog	Timber Rattlesnake
Wood Turtle		

Threats and Action Drivers associated with this conservation need

9 Pollution

9.3 Agricultural and Forestry Effluents

9.3.3 Herbicides and Pesticides

9.3.3.1 Pesticides degrade terrestrial and aquatic habitats, especially streams, ponds and wetlands. Aquatic wildlife are particularly sensitive to these contaminants, which can cause developmental and behavioral abnormalities and reproductive failure. Some contaminants may bioaccumulate in predatory fish and birds and disrupt reproduction.

9.3.3.2 Use of rodenticides can cause secondary actions of injury and death to animals in the course of scavenging.

9.3.3.3 Use of pesticides can directly harm non-target species through direct contact and/or by reducing and/or contaminating their food supply.

9.3.3.4 Use of herbicides can destroy beneficial food and nectar plants for insects.

Conservation actions that address Threats and Action Drivers

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.14 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of herbicides and pesticides, and implementing more ecologically safe strategies when using such products.

1.2.1.15 Create incentives (non-monetary and/or monetary) for and programs to deliver those incentives to NJ landowners and land managers (including farmers, foresters and developers) for reducing or eliminating the use of rodenticides, and implementing more ecologically safe strategies when using such products.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.37 Enlist landowners and NJ citizens in the protection of and survey efforts for SGCN, in particular rare species, by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management and wildlife-related volunteer programs.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.10 Develop and provide (or otherwise make publicly available) educational programs and/or materials to educate landowners and NJ citizens on threats to fish and wildlife (including marine animals).

8.3.0.31 Develop an educational outreach program for landowners and citizens on the secondary impacts of rodenticides on predators and scavengers.

8.3.0.32 Develop an educational outreach program for landowners and citizens on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

11 Technical Assistance

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.4 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the secondary impacts of rodenticides on predators and scavengers.

11.2.0.5 Provide educational resources, training programs, and expert guidance to private and public landowners and land managers on the threats that herbicides and pesticides pose to aquatic systems and wildlife, and to promote safer usage of such products.

Job 26.03. Stormwater and Wastewater Management

Objective: Reduce point and nonpoint source pollution resulting from stormwater by supporting pending legislation focused on this issue.

Purpose: Protect marine and freshwater species from the impacts of stormwater-related run-off by reducing chemical stressors that cause physical and biological stress on sensitive SGCN.

Benefits: Cleaner waters that provide numerous benefits and ecosystem services to aquaculture, marine and freshwater fish species, and aquatic invertebrates such as freshwater mussels. Cleaner waters will also benefit tourism, public health, and safety.

Focal wildlife species benefitting from this job

Birds

Black Rail	Little Blue Heron	Northern Harrier
Pied-billed Grebe	Red Knot	Ruddy Turnstone
Snowy Egret	Tricolored Heron	

Fish

Alewife	Atlantic Sturgeon	Banded Sunfish
Blackbanded Sunfish	Blueback Herring	Bridle Shiner
Brook Trout	Comely Shiner	Ironcolor Shiner
Mud Sunfish	Shortnose Sturgeon	Swamp Darter

Macroinvertebrates

Brook Floater	Dwarf Wedgemussel	Eastern Lampmussel
Green Floater	New England Bluet	Pine Barrens Bluet
Robust Baskettail	Scarlet Bluet	Septima's Clubtail
Superb Jewelwing	Triangle Floater	Yellow Lampmussel

Mammals

Indiana Bat	Little Brown Bat	North Atlantic Right Whale

Northern Myotis

Reptiles & Amphibians

Atlantic Green Turtle	Atlantic Leatherback	Atlantic Loggerhead
Atlantic Ridley	Bog Turtle	Carpenter Frog
Eastern Box Turtle	Eastern Redbelly Turtle	Eastern Spadefoot
Eastern Tiger Salamander	Longtail Salamander	Northern Diamondback Terrapin
Northern Red Salamander	Pine Barrens Treefrog	Timber Rattlesnake
Wood Turtle		

Threats and Action Drivers associated with this conservation need

12 Resource Management Needs

12.3 Regulatory Reform

12.3.0 State Regulatory Reforms

12.3.0.1 Regulatory habitat protections within state land use regulations are spatially limited to specific geographic areas (e.g., Pinelands, Coastal Area) or geographic features (e.g., wetlands, streams) and so fail to protect critical habitats that exist outside of these regulated areas.

Conservation actions that address Threats and Action Drivers

100 Law and Policy

100.3 State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.26 Adopt regulations requiring the combined sewer overflow alternative analyses required by regulation address potential impacts to wildlife in watercourses or receiving water bodies.

100.3.0.42 Fully adopt the former Stormwater Management Rules' 300ft buffer requirements into the Flood Hazard Area Control Act Rules.

100.3.0.50 Retain endangered, threatened and special concern wildlife and habitat protection measures in the Water Quality Management Program Rules.

100.4 State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.21 Ensure that Section 303(d) of the Clean Water Act and applicable State statutory/regulatory requirements for surface water pollutant budgets are being met by monitoring and enforcing regulatory Total Maximum Daily Load (TMDL) targets established within regional Water Quality Management Plans.

Job 26.04. Support the Pending "Plastic Bag Surcharge" Legislation in New Jersey

Objective: Decrease the amount of plastic shopping bags available to enter the marine environment through the support and passage of legislation to limit the amount of bags in circulation.

Purpose: Minimize harm to marine wildlife that may otherwise become entangled in and/or ingest the plastic bags.

Benefits: Minimize the opportunity for animals to consume or become entangled in plastic bags to help decrease injury/mortality of SGCN. Such action will improve habitat by decreasing garbage accumulation in the environment.

Focal wildlife species benefitting from this job

Fish

Alewife | Atlantic Sturgeon | Blueback Herring

Shortnose Sturgeon

Mammals

North Atlantic Right Whale

Reptiles & Amphibians

Atlantic Green Turtle | Atlantic Leatherback | Atlantic Loggerhead

Atlantic Ridley | Northern Diamondback Terrapin

Threats and Action Drivers associated with this conservation need

9 Pollution

9.4 Garbage and Solid Waste

9.4.1 Direct hazards to wildlife

9.4.1.1 Wildlife may ingest garbage causing choking or impingement in the digestive system, or they may become physically entangled in it (e.g., plastic or abandoned fish nets); conditions that make them unable to feed or drink, cause them to suffocate or drown, or otherwise restrict the animal's movement making them more susceptible to predators, starvation or injury.

Conservation actions that address Threats and Action Drivers

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.27 Create legislation to re-instate incentives for citizens bringing their own shopping bag(s) to grocery stores in an effort to decrease the amount of plastic shopping bags in circulation.

8 Outreach

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.33 Develop an educational outreach program for citizens regarding: 1) The impacts to wildlife as a result of plastic bags entering aquatic and marine systems, 2) The importance of decreasing the amount of plastic shopping bags in circulation, 3) The need for businesses to voluntarily charge for bags or reimburse people for using their own non-plastic bags, and 4) The need for their assistance through public pressure on legislators and government to pass legislation that that limits the amount of plastic shopping bags in circulation.

100 Law and Policy

100.3 State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.36 Create legislation to limit the amount of plastic from shopping bags in circulation and re-instate incentives for citizens bringing their own shopping bag to grocery store.

100.3.0.37 Develop a law and/or policy that requires NJ DEP to continue to address and correct the allowable combined sewer overflow inputs of solid waste into the marine environment to minimize harm to wildlife and their habitats.

100.4 State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.7 Develop a law and/or policy that requires NJ DEP to continue to address and correct the allowable combined sewer overflow inputs of solid waste into the marine environment to minimize harm to wildlife and their habitats.

Project 27. Research and Monitoring

Job 27.01. Long-term Wildlife Disease Research and Monitoring

Objective: Research and monitor wildlife diseases, distribution and expansion, life history cycles, exacerbating factors (e.g., climate change), and the resiliency of wildlife species.

Purpose: Enable wildlife managers and conservationists to develop and implement strategies to combat and/or minimize the spread and impacts of wildlife diseases.

Benefits: Increase understanding of wildlife diseases and their presence/distribution within the State.

Objective: Establish a long-term research and monitoring program for wildlife diseases through the incorporation of a budgetary line item designated to consistently fund such research.

Purpose: Enable wildlife managers and conservationist to gather consistent, useful data over the long-term to help better understand diseases and increase the chance of developing strategies to combat and/or minimize their spread and impact on wildlife.

Benefits: Increase understanding of wildlife diseases and their presence/distribution within the State at baseline levels.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	American Woodcock	Black Rail
Black Skimmer	Blue-winged Warbler	Bobolink
Cerulean Warbler	Common Tern	Eastern Meadowlark
Forster's Tern	Golden-winged Warbler	Grasshopper Sparrow
Kentucky Warbler	Least Tern	Little Blue Heron
Northern Bobwhite	Northern Harrier	Peregrine Falcon
Pied-billed Grebe	Piping Plover	Prothonotary Warbler
Red Knot	Red-headed Woodpecker	Ruddy Turnstone
Scarlet Tanager	Snowy Egret	Tricolored Heron
Vesper Sparrow	Wood Thrush	

Fish

Alewife	Atlantic Sturgeon	Banded Sunfish
Blackbanded Sunfish	Blueback Herring	Bridle Shiner
Brook Trout	Comely Shiner	Ironcolor Shiner

Mud Sunfish	Shortnose Sturgeon	Swamp Darter
Macroinvertebrates		
A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper
Ashton Cuckoo Bumble Bee	Brook Floater	Buchholz's Dart Moth
Buchholz's Gray	Carter's Noctuid Moth	Daecke's Pyralid Moth
Dotted Skipper	Dwarf Wedgemussel	Eastern Lampmussel
Frosted Elfin	Georgia Satyr	Green Floater
Hoary Elfin	Leonard's Skipper	Little White Tiger Beetle
Maritime Sunflower Borer Moth	New England Bluet	New Jersey Pine Barrens Tiger Beetle
Northeastern Beach Tiger Beetle	Northern Metalmark	Papaipema harrisii
Pine Barrens Bluet	Pink Sallow	Robust Baskettail
Rusty Patched Bumble Bee	Sand Myrtle Looper/Pink	Scarlet Bluet
Septima's Clubtail	Southeastern Beach Tiger Beetle	Southern Plains Bumble Bee
Superb Jewelwing	Triangle Floater	Variable Cuckoo Bumble Bee
Yellow Bumble Bee	Yellow Lampmussel	Yellow-banded Bumble Bee
Mammals		
Allegheny Woodrat	Indiana Bat	Little Brown Bat
Northern Myotis		
Reptiles & Amphibians		
Bog Turtle	Carpenter Frog	Corn Snake
Eastern Box Turtle	Eastern Hognose Snake	Eastern Redbelly Turtle
Eastern Spadefoot	Eastern Tiger Salamander	Longtail Salamander
New Jersey Chorus Frog	Northern Black Racer	Northern Diamondback Terrapin
Northern Pine Snake	Northern Red Salamander	Northern Scarlet Snake
Pine Barrens Treefrog	Timber Rattlesnake	Wood Turtle

Threats and Action Drivers associated with this conservation need

2 Agriculture and Aquaculture

2.4 Marine and Freshwater Aquaculture

2.4.2 Industrial Aquaculture

2.4.2.8 Potential for fish to escape and compete with, predate upon, or spread disease to fish species that serve as hosts for SGCN freshwater mussels.

6 Human Intrusions and Disturbance

6.3 Work and Other Activities

6.3.1 Unauthorized research projects at significant habitats

6.3.1.4 Illegal transfer of freshwater fish from one waterbody/watershed to another can result in the spread of non-native, invasive and/or undesirable fish or mussel species and/or diseases.

6.3.1.5 Illegal transfer of freshwater mussels from one waterbody/watershed to another can result in the spread of non-native, invasive and/or undesirable mussel species and/or diseases.

6.3.2 Authorized research projects at significant habitats

6.3.2.5 Authorized transfer of freshwater fish from one waterbody/watershed to another can result in the spread of non-native, invasive and/or undesirable fish or mussel species and/or diseases.

6.3.2.6 Authorized transfer of freshwater mussels from one waterbody/watershed to another can result in the spread of non-native, invasive and/or undesirable mussel species and/or diseases.

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.6 Invasive non-native fungal/bacterial diseases

8.1.6.1 The introduction of non-native fungal and bacterial diseases threatens native populations and ecosystems.

8.2 Problematic Native Species/Diseases

8.4.1 Unspecified Species

8.4.1.1 Non-native or poorly understood diseases and parasites could potentially impact native animals.

8.2.2 Named Species

8.2.2.2 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

8.4.2 Named Species

8.4.2.2 Diseases of unknown origin, such as snake fungal disease and Ranavirus, can cause significant mortality among native animal populations.

8.5 Viral/Prion-induced Diseases

8.5.1 Unspecified Species (Disease)

8.5.1.1 There is a large knowledge gap regarding the existence of, or potential for, other diseases impacting native wildlife.

8.5.2 Named Species (Disease)

8.5.2.1 Diseases such as West Nile Virus, arenavirus, sudden oak death, Avian Influenza, and snake fungal disease cause morbidity or mortality to native populations.

8.5.2.2 Viral Hemorrhagic Septicemia (VHS) (recently introduced into the Great Lakes) has caused mortality in 30 common fish species across many families. Although many of the fish SGCN have not been tested, it is hypothesized that they may be vulnerable. If introduced into NJ, VHS is predicted to cause widespread fish kills.

8.6 Diseases of Unknown Cause

8.6.0 Unknown Diseases

8.6.0.1 Diseases yet to be identified by pathologists and virologists cause decreased fitness or mortality to native populations.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.2 Lack of up-to-date existing information

12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

2 Direct Management of Natural Resources

2.14 Wildlife disease management

2.14.0 Wildlife disease strategy development and investigation

2.14.0.1 Investigate diseases/pathogens impacting SGCN and/or their habitats.

2.14.0.2 Develop and implement strategies to combat the impacts of diseases/pathogens impacting SGCN and/or their habitats, track disease occurrences and monitor/research impacts to SGCN populations and their habitats.

2.14.0.4 Conduct long-term monitoring of diseases in vulnerable wildlife to determine the magnitude of exposure within populations and around the State, the impacts to those species, in particular SGCN, and investigate the feasibility of mitigating for such impacts.

2.14.0.5 Assess the impacts of diseases on the life cycles of wildlife.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

100 Law and Policy

100.1 Legislation

100.1.3 Sub-national Level

100.1.3.3 Initiate legislative action to establish an annual budgetary line item designating funds to support programs focused on long-term research and monitoring of wildlife diseases.

Job 27.02. Power Plant Thermal Discharge and the Entrainment and Impingement of Aquatic Species

Objective: Monitor entrainment, impingement, and thermal discharge at power plants to ensure the potential for adverse impact is minimized.

Purpose: Protect sturgeon, alewife and blueback herring, sea turtles, and other aquatic species, particularly SGCN, from injury and morality associated with power plant operations.

Benefits: Stabilize and improve populations of important marine, estuarine, and freshwater aquatic species.

Focal wildlife species benefitting from this job

Fish

Alewife	Atlantic Sturgeon	Blueback Herring
Shortnose Sturgeon		

Macroinvertebrates

Brook Floater	Dwarf Wedgemussel	Eastern Lampmussel

Green Floater	New England Bluet	Pine Barrens Bluet
Robust Baskettail	Scarlet Bluet	Septima's Clubtail
Superb Jewelwing	Triangle Floater	Yellow Lampmussel

Threats and Action Drivers associated with this conservation need

3 Energy Production and Mining

3.4 Conventional Power Plants

3.4.0 Conventional Power Plants

3.4.0.3 Alteration of the temperature, pH and/or hydrology of aquatic ecosystems change plant communities and can harm wildlife and/or impact their behavior and survivorship.

7 Natural Systems Modifications

7.2 Dams and Water Management/Use

7.2.2 Abstraction of Surface Water (commercial use)

7.2.2.4 Water intake systems associated with industrial use and power plants threaten aquatic organisms due to injury or mortality from impingement and/or entrainment.

9 Pollution

9.6 Excess Energy

9.6.2 Thermal Pollution

9.6.2.1 Water temperature changes due to industrial discharge of heated water may impact species composition in the receiving waterbody. Species such as sea turtles and migrating fish may be attracted to the thermal plume and become more vulnerable to mortality during emergency shutdowns during cooler months.

9.6.2.2 Water temperature changes to aquatic systems can deter or preclude use by SGCN (e.g., alter habitat suitability for wildlife species, reduce prey base) or present stressors that are harmful if not fatal to wildlife.

9.6.2.3 Water temperature changes due to industrial discharge of heated water in aquatic systems may be stressful/fatal to free floating freshwater mussel glochida.

Conservation actions that address Threats and Action Drivers

3 Data Collection and Analysis

3.3 Research, survey or monitoring - habitat

3.3.2 Monitoring

3.3.2.14 Research and evaluate the effectiveness of water quality management practices on water-dependent and semi-dependent SGCN, particularly those practices associated with permitting or mitigation actions.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.23 Revise water quality management practices based on research on water-dependent and semi-dependent SGCN, particularly when associated with permitting or mitigation actions.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.23 Reduce the impacts of entrainment, impingement and thermal discharge at power plants by working with conservation partners, academia, etc. to ensure that best available technologies are utilized wherever possible.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.32 Work with NJ DEP's Water Management, other state agencies and watershed organizations to determine if mitigation is warranted at applicable power plants.

8.1.0.49 Reduce the impacts of entrainment, impingement and thermal discharge at power plants by working with conservation partners, academia, etc. to ensure that best available technologies are utilized wherever possible.

100 Law and Policy

100.3 State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.9 Secure mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.23 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.49 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address the issue of disturbance to habitat or species as a result of human activites (e.g., construction, bridge maintenance, road work, etc.).

Job 27.03. Assessing the Distribution and Habitat Needs of Freshwater SGCN

Objective: Generate an up-to-date distribution and habitat suitability map for freshwater Focal SGCN with data gathered from population surveys and habitat assessments.

Purpose: To obtain the necessary information to better protect and manage for rare fish, odonates, and freshwater mussels which currently have limited distribution data and poorly understood habitat requirements.

Benefits: Increase knowledge and data to inform management and regulatory protection of species and critical habitats.

Focal wildlife species benefitting from this job

Fish

Alewife	Atlantic Sturgeon	Banded Sunfish
Blackbanded Sunfish	Blueback Herring	Bridle Shiner
Brook Trout	Comely Shiner	Ironcolor Shiner
Mud Sunfish	Shortnose Sturgeon	Swamp Darter

Macroinvertebrates

Brook Floater	Dwarf Wedgemussel	Eastern Lampmussel
Green Floater	New England Bluet	Pine Barrens Bluet
Robust Baskettail	Scarlet Bluet	Septima's Clubtail
Superb Jewelwing	Triangle Floater	Yellow Lampmussel

Threats and Action Drivers associated with this conservation need

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory

12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.2 Lack of up-to-date existing information

12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.3 Need to answer research question

12.1.3.1 There are significant knowledge gaps regarding distribution, dispersal, diseases, population trends, etc. of SGCN.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.3 Survey for and monitor populations of freshwater aquatic focal SGCN to assess the populations' demography, trends, condition, distribution, etc.

3.2.0.18 Conduct baseline surveys/inventories to better understand the distribution of fish and invertebrate (including freshwater mussels) populations.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.26 Survey all historic locations and unsurveyed suitable habitats to identify populations of freshwater aquatic focal species.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

Job 27.04. Culverts and Wildlife Passage: Culvert Placement

Objective: Assess existing culverts to determine if it would be beneficial to SGCN to retrofit the structure to improve wildlife passage or to replace the existing structure. Identify and assess locations where a culvert installation would enhance wildlife passage.

Purpose: Minimize negative impacts of culvert presence and/or absence on aquatic and terrestrial SGCN.

Benefits: Maintain water flow, increase habitat connectivity, provide opportunity for resident and migratory fish to expand their ranges, thereby improving resiliency to climatic changes, and provide/incorporate dry passage for wildlife not willing to wade through water. Larger culverts reduce the likelihood of a blowout and replacement/removal of undersized culverts decreases erosion.

Focal wildlife species benefitting from this job

Fish

Alewife	Banded Sunfish	Blackbanded Sunfish
Blueback Herring	Bridle Shiner	Brook Trout
Comely Shiner	Ironcolor Shiner	Mud Sunfish
Swamp Darter		

Macroinvertebrates

Brook Floater	Dwarf Wedgemussel	Eastern Lampmussel
Green Floater	Triangle Floater	Yellow Lampmussel

Mammals

Allegheny Woodrat

Reptiles & Amphibians

Bog Turtle	Carpenter Frog	Corn Snake
Eastern Box Turtle	Eastern Hognose Snake	Eastern Redbelly Turtle
Eastern Spadefoot	Longtail Salamander	New Jersey Chorus Frog
Northern Black Racer	Northern Diamondback Terrapin	Northern Pine Snake
Northern Red Salamander	Northern Scarlet Snake	Pine Barrens Treefrog
Timber Rattlesnake	Wood Turtle	

Threats and Action Drivers associated with this conservation need

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory

12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.2 Lack of up-to-date existing information

12.1.2.2 Lack of wildlife monitoring at sites with structures that pose high risk of mortality to SGCN wildlife.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.19 Identify the presence and status (e.g., functioning, structure, slated for removal, etc.) of existing dams and culverts within and/or that may impact SGCN and their habitats, and create a database that includes a GIS component identifying the locations of such structures and their status. Share this information with appropriate organizations and/or agencies evaluating the benefits and risks of such structures on SGCN and their habitats.

3.0.0.20 Once baseline data identifying and describing the status of existing dams and culverts have been gathered, conduct evaluations at a variety of sites to determine whether the benefits of culvert and dam creation or removal outweigh the risks to SGCN species and their habitats, and if other variables/conditions specific to individual sites/locations result in a different outcome. Identify and target appropriate dams and culverts for removal and/or reconstruction to minimize harm to SGCN species and their habitats.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.3 Baseline inventory

3.2.3.7 Identify roads or portions of roads, paved or unimproved (through site surveys, land use/land cover assessments and analyses, review of available data, enlistment of species experts, etc.) with high incidences of road mortality and/or presence of snakes, turtles, medium-sized and large mammals. Conduct assessments of the roads and incorporate information into a database that includes descriptions (e.g., qualifiers to help prioritize the roads' risk to wildlife) and a GIS component of the locations of such areas. Share this information with appropriate organizations and/or agencies working to implement measures (e.g., wildlife passages, road closures) to minimize the risk to these species.

3.5 Techniques development

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.9 Conduct studies to evaluate the impacts of roads on SGCN and develop, implement and conduct studies to evaluate the effectiveness of methods to reduce road mortality of wildlife (e.g. wildlife underpasses, road closures).

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

Job 27.05. Dams and Aquatic Species' Passage: Dam Removal

Objective: Evaluate existing dams to determine whether removal would be beneficial or detrimental to Focal SGCN and their habitats through site assessments and surveys. Identify additional threats that may result from the dams' presence and/or are compounding the impact of the dam.

Purpose: Improve/restore riverine, stream and creek aquatic systems for SGCN.

Benefits: Improve habitat connectivity and expansion/restoration of gene flow for aquatic species such as anadromous and resident fish, freshwater mussels via fish hosts, and stream-associated Odonata.

Focal wildlife species benefitting from this job

Fish

Alewife	Banded Sunfish	Blackbanded Sunfish
Blueback Herring	Bridle Shiner	Brook Trout
Comely Shiner	Ironcolor Shiner	Mud Sunfish
Swamp Darter		

Macroinvertebrates

Brook Floater	Dwarf Wedgemussel	Eastern Lampmussel
Green Floater	Robust Baskettail	Septima's Clubtail
Superb Jewelwing	Triangle Floater	Yellow Lampmussel

Reptiles & Amphibians

Eastern Redbelly Turtle	Wood Turtle

Threats and Action Drivers associated with this conservation need

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory

12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.2 Lack of up-to-date existing information

12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.19 Identify the presence and status (e.g., functioning, structure, slated for removal, etc.) of existing dams and culverts within and/or that may impact SGCN and their habitats, and create a database that includes a GIS component identifying the locations of such structures and their status. Share this information with appropriate organizations and/or agencies evaluating the benefits and risks of such structures on SGCN and their habitats.

3.0.0.20 Once baseline data identifying and describing the status of existing dams and culverts have been gathered, conduct evaluations at a variety of sites to determine whether the benefits of culvert and dam creation or removal outweigh the risks to SGCN species and their habitats, and if other variables/conditions specific to individual sites/locations result in a different outcome. Identify and target appropriate dams and culverts for removal and/or reconstruction to minimize harm to SGCN species and their habitats.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.18 Conduct baseline surveys/inventories to better understand the distribution of fish and invertebrate (including freshwater mussels) populations.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

Job 27.06. Address Focal Insect SGCN Data Gaps

Objective: Conduct research related to Focal insect SGCN to better determine their distribution, habitats, life history requirements, and threats to improve the understanding of their conservation and management needs.

Purpose: Address vital data gaps regarding many insect species to help inform management and conservation planning, decision making, and regulatory protection needs.

Benefits: Provide land managers and conservation organizations with comprehensive information related to the Focal insect SGCN to improve management and conservation strategies, and minimize harm to these species during management activities.

Focal wildlife species benefitting from this job

Macroinvertebrates

A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper
Ashton Cuckoo Bumble Bee	Buchholz's Dart Moth	Buchholz's Gray
Carter's Noctuid Moth	Daecke's Pyralid Moth	Dotted Skipper
Frosted Elfin	Georgia Satyr	Hoary Elfin
Leonard's Skipper	Little White Tiger Beetle	Maritime Sunflower Borer Moth
New England Bluet	New Jersey Pine Barrens Tiger Beetle	Northern Metalmark

Papaipema harrisii	Pine Barrens Bluet	Pink Sallow
Robust Baskettail	Rusty Patched Bumble Bee	Sand Myrtle Looper/Pink
Scarlet Bluet	Septima's Clubtail	Southeastern Beach Tiger Beetle
Southern Plains Bumble Bee	Superb Jewelwing	Variable Cuckoo Bumble Bee
Yellow Bumble Bee	Yellow-banded Bumble Bee	

Threats and Action Drivers associated with this conservation need

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory

12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.2 Lack of up-to-date existing information

12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

Conservation actions that address Threats and Action Drivers

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.1 Conduct long-term monitoring of resident and migratory SGCN populations using standardized survey protocols to determine the variables that may impact their long-term persistence in the State (e.g., population viability, distribution, dispersal, home range and habitat use, travel corridors, food availability, vulnerability to pollutants and disease, etc.). Compile this information to determine the likely causes of population declines and to understand metapopulation dynamics. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.2 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) where data gaps exist regarding SGCN distribution, and their critical and supportive habitats. Conduct surveys using standardized survey protocols to acquire baseline data, and provide the data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.0.0.3 Gather baseline data on SGCN inhabiting permanently protected natural lands regarding their distribution and population (e.g., abundance, dispersal, demography including productivity and survival, etc.), and identify (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) critical and supporting habitats within those landscapes.

3.0.0.5 Gather baseline data on resident and migratory SGCN (in particular migratory species for which New Jersey habitats are significant), terrestrial, freshwater and marine species, regarding the location and condition of their critical and supporting habitats (e.g., foraging, roosting, nesting/breeding, stopover, migration paths, etc.), and population demography (e.g., productivity, survival, dispersal). Compile this information into a database that includes descriptions of the conditions of the habitats and species, and a GIS component of the locations of these important habitats. Provide data to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.6 Conduct long-term studies on resident and migratory SGCN to determine if there are changes to the populations' demography (productivity, survival, dispersal) and/or to their critical and/or supporting habitats (i.e., diminishing in value, acreage or connectivity, etc.), in particular changes that would not maintain SGCN at viable levels for species populations. Update data and GIS maps; provide updated information to NJ DEP for integration into the Biotics database, Landscape Project and permitting review processes.

3.0.0.10 Conduct long-term studies to evaluate the effectiveness of management strategies implemented to enhance food/prey availability for SGCN [whose populations are thought to be limited due wholly or in part to a lack of (or contaminated) food resources] through studies that investigate the populations and health of the food resources as well as the target SGCN. Revise management strategies as needed and continue to monitor the effectivenes of the efforts.

3.0.0.12 Compile available life history information on urban-associated SGCN (e.g., predators, levels of nest/young depredation, breeding longevity and reproductive effort over time, preferred nesting/reproductive requirements, fidelity to breeding and wintering sites, comprehensive assessment of migration routes and destinations) for future development of management strategies to benefit such species.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.1 Abundance determination

3.2.1.1 Identify (through literature searches, review of available data, enlistment of habitat and/or species experts, etc.) population abundance and trends for SGCN using standardized survey protocols. Provide data to NJ DEP for integration into the Biotics database, Landscape Project Map and permitting review processes.

3.2.3 Baseline inventory

3.2.3.9 Investigate hazardous environmental issues that may impact grassland invertebrates.

3.2.5 Genetics

3.2.5.1 Investigate the feasibility and potential for success of conducting genetic rescue through translocation and/or reintroduction of animals into suitable habitat that was historically occupied to increase genetic diversity and reconnect isolated populations. Methods of investigation should include, but are not limited to, thorough literature reviews, expert opinions, identifying potential pitfalls (e.g., species' fidelity to their range or critical areas), and an examination of historic and current SGCN population distribution and suitable habitat availability.

Job 27.07. Wind Turbines and Wildlife

Objective: Investigate the effects of above-water, offshore wind turbine structures and their operation on wildlife such as pelagic birds, waterfowl, migratory songbirds, raptors, bats, and marine animals, including the specific causes of any observed impacts (e.g., high collision risk, attractiveness for perching, air pressure changes, submarine vibrations, etc.).

Purpose: Understand the impacts of wind turbines on migratory and resident birds, bats, and marine wildlife in order for managers to develop recommendations to minimize harm.

Benefits: Greater capacity to develop and defend strategies that safeguard wildlife from the impacts of wind turbines, such as seasonal operating restrictions, use of visual and/or acoustic wildlife deterrents, and the compatible placement and design of future projects.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	American Woodcock	Black Rail
Black Skimmer	Blue-winged Warbler	Bobolink
Cerulean Warbler	Common Tern	Eastern Meadowlark
Forster's Tern	Golden-winged Warbler	Grasshopper Sparrow
Kentucky Warbler	Least Tern	Little Blue Heron
Northern Bobwhite	Northern Harrier	Peregrine Falcon
Pied-billed Grebe	Piping Plover	Prothonotary Warbler
Red Knot	Ruddy Turnstone	Scarlet Tanager
Snowy Egret	Tricolored Heron	Vesper Sparrow
Wood Thrush		

Fish

Alewife	Atlantic Sturgeon	Blueback Herring
Shortnose Sturgeon		

Mammals

Indiana Bat	Little Brown Bat	North Atlantic Right Whale
Northern Myotis		

Reptiles & Amphibians

Atlantic Green Turtle	Atlantic Leatherback	Atlantic Loggerhead
Atlantic Ridley	Northern Diamondback Terrapin	

Threats and Action Drivers associated with this conservation need

3 Energy Production and Mining

3.3 Renewable Energy

3.3.1 Wind Power

3.3.1.1 Turbines, blades, and structure foundations create a collision risk to volant species (birds, bats and invertebrates) and marine animals.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory

12.1.1.6 Lack of information regarding migratory pathways and response of wildlife to lights and noise associated with offshore wind turbines.

12.1.2 Lack of up-to-date existing information

12.1.2.2 Lack of wildlife monitoring at sites with structures that pose high risk of mortality to SGCN wildlife.

12.1.3 Need to answer research question

12.1.3.4 Lack of information regarding the potential short- and long-term impacts of wind turbines and other tall coastal structures on migratory populations.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.25 Identify pathways of migratory SGCN in the Atlantic Coastal and Marine Regions (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) and use the data to help evaluate the potential short- and long-term impacts of wind turbines, radio towers, utility guy lines, and other tall coastal structures on migratory populations.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.17 Conduct monitoring at constructed wind farms (within or outside of NJ) to assess the impacts on migratory species (birds, bats, insects) and determine if NJ's land use planning efforts and/or smart-growth plans need to be revised.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.14 Compile information (obtained through literature reviews, communication with other States along the Atlantic coast, academia, etc.) regarding the impacts of above-water operation of wind turbines on migratory marine birds and bats. Provide data to appropriate governing agencies and/or State commissions for integration into permitting review processes.

3.3.1.15 Conduct a literature review to determine the potential impacts of underwater vibrational noise on marine mammals, sea turtles and fishes emanating from offshore wind turbines during routine operations.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

Job 27.08. Project Coordination with University Faculty and Students

Objective: Work with Universities to identify and develop projects to collaborate on with faculty and students.

Purpose: Broaden the ability to conduct conservation research and planning efforts.

Benefits: Increase ability to make informed decisions and meet conservation objectives.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	American Woodcock	Black Rail
Black Skimmer	Blue-winged Warbler	Bobolink
Cerulean Warbler	Common Tern	Eastern Meadowlark
Forster's Tern	Golden-winged Warbler	Grasshopper Sparrow
Kentucky Warbler	Least Tern	Little Blue Heron
Northern Bobwhite	Northern Harrier	Peregrine Falcon
Pied-billed Grebe	Piping Plover	Prothonotary Warbler
Red Knot	Red-headed Woodpecker	Ruddy Turnstone
Scarlet Tanager	Snowy Egret	Tricolored Heron
Vesper Sparrow	Wood Thrush	

Fish

Alewife	Atlantic Sturgeon	Banded Sunfish
Blackbanded Sunfish	Blueback Herring	Bridle Shiner
Brook Trout	Comely Shiner	Ironcolor Shiner
Mud Sunfish	Shortnose Sturgeon	Swamp Darter

Macroinvertebrates

A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper
Ashton Cuckoo Bumble Bee	Brook Floater	Buchholz's Dart Moth
Buchholz's Gray	Carter's Noctuid Moth	Daecke's Pyralid Moth
Dotted Skipper	Dwarf Wedgemussel	Eastern Lampmussel
Frosted Elfin	Georgia Satyr	Green Floater
Hoary Elfin	Leonard's Skipper	Little White Tiger Beetle
Maritime Sunflower Borer Moth	New England Bluet	New Jersey Pine Barrens Tiger Beetle
Northeastern Beach Tiger Beetle	Northern Metalmark	Papaipema harrisii
Pine Barrens Bluet	Pink Sallow	Robust Baskettail
Rusty Patched Bumble Bee	Sand Myrtle Looper/Pink	Scarlet Bluet
Septima's Clubtail	Southeastern Beach Tiger Beetle	Southern Plains Bumble Bee
Superb Jewelwing	Triangle Floater	Variable Cuckoo Bumble Bee

Yellow Bumble Bee	Yellow Lampmussel	Yellow-banded Bumble Bee
Mammals		
Allegheny Woodrat	Indiana Bat	Little Brown Bat
North Atlantic Right Whale	Northern Myotis	
Reptiles & Amphibians		
Atlantic Green Turtle	Atlantic Leatherback	Atlantic Loggerhead
Atlantic Ridley	Bog Turtle	Carpenter Frog
Corn Snake	Eastern Box Turtle	Eastern Hognose Snake
Eastern Redbelly Turtle	Eastern Spadefoot	Eastern Tiger Salamander
Longtail Salamander	New Jersey Chorus Frog	Northern Black Racer
Northern Diamondback Terrapin	Northern Pine Snake	Northern Red Salamander
Northern Scarlet Snake	Pine Barrens Treefrog	Timber Rattlesnake
Wood Turtle		

Threats and Action Drivers associated with this conservation need

14 Education/ Outreach Needs

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions

14.2.1.1 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various forest management practices.

14.2.1.2 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various aquatic and riparian management practices.

14.2.1.3 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various coastal management practices.

14.2.1.4 Need to develop greater understanding of and support for efforts implemented to maintain disturbance-free habitats that allow coastal wildlife populations to thrive alongside human residential and recreational uses.

14.2.1.5 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various wetland management practices.

Conservation actions that address Threats and Action Drivers

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.19 Engage government agencies, conservation partners and other stakeholders to collaboratively develop a list of important projects, targeting SGCN and/or their habitat, as a guide for graduate student research. Distribute the list and contact information to all State colleges and universities.

Project 28. Harvests, By-catch and Impingement

Job 28.01. Remove Impingement Hazards, Reduce Mortality, and Restore Natural Habitat for Horseshoe Crabs

Objective: Using citizen science data, identify impingement hazards, specifically rip-rap, derelict structures, and natural hazards, and create a database and GIS layer to document the information.

Purpose: Identify impingement hazards along the Delaware Bay shoreline.

Benefits: Reduce horseshoe crab mortality and improve spawning habitat to increase egg abundance, and improve development and hatching success, thereby increasing egg/larval density for foraging migratory shorebirds and marine species.

Objective: Develop a plan to reduce horseshoe crab mortality from impingement hazards, fisheries by-catch, and lysate industry bleeding that includes, at a minimum, the following: a) a timeline, b) potential funding sources, c) the prioritization of impingement hazards for removal, d) improved bycatch reporting to be applied to horseshoe crab harvest management, and e) coordination with the lysate industry to reduce or eliminate horseshoe crab mortality.

Purpose: Provide guidance to reduce and account for sources of horseshoe crab mortality.

Benefits: Reduce horseshoe crab mortality and improve spawning habitat to increase egg abundance, and improve development and hatching success, thereby increasing egg/larval density for foraging migratory shorebirds and marine species.

Objective: Implement the plan to remove impingement hazards on Delaware Bay shoreline beaches and conduct long-term monitoring to assess the effectiveness of hazard removals.

Purpose: Reduce crab mortality by removing impingement hazards along the Delaware Bayshore spawning beaches.

Benefits: Reduce horseshoe crab mortality and improve spawning habitat to increase egg abundance, and improve development and hatching success, thereby increasing egg/larval density for foraging migratory shorebirds and marine species.

Focal wildlife species benefitting from this job

Birds

Red Knot Ruddy Turnstone

Threats and Action Drivers associated with this conservation need

2 Agriculture and Aquaculture

2.4 Marine and Freshwater Aquaculture

2.4.1 Subsistence/Artisinal Aquaculture

2.4.1.6 Potential for aquaculture structures to create impingement/entanglement hazard and/or preclude benthic habitat use by SGCN.

2.4.2 Industrial Aquaculture

2.4.2.6 Potential for aquaculture structures to create impingement/entanglement hazard and/or preclude benthic habitat use by SGCN.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory

12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.2 Lack of up-to-date existing information

12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

12.1.3 Need to answer research question

12.1.3.3 Lack of studies specific to structural shellfish aquaculture (racks, bottom cages, bottom screens, etc.) and tending activities which may adversely impact horseshoe crabs, shorebirds and other benthic-dependent species.

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform

12.4.0.6 Techniques for ecological management or restoration of shorelines are not fully developed or evaluated for effectiveness for target and non-target SGCN in coastal areas.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.18 Develop, implement and evaluate the effectiveness (through research and long-term monitoring) of engineering standards that embrace both shore protection/resiliency and habitat creation for shorebirds, horseshoe crabs and other coastal species along the Atlantic and Delaware Bay coasts that minimize horseshoe crab impingement and damage to beach habitat from residential and commercial construction.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.19 Develop, implement and evaluate aquaculture practices in coastal areas that are compatible with the recovery of SGCNs and industry needs.

3.2.0.26 Develop, implement and evaluate efforts to remove horseshoe crab impingement hazards, and provide recommendations of potential improvements, if warranted.

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.25 Compile an inventory of all horseshoe crab impingement hazards and share with permitting agencies, and the fisheries organizations and industry.

3.3.2 Monitoring

3.3.2.2 Conduct long-term monitoring of resident and migratory SGCN habitats using standardized survey protocols to determine changes in habitat quality/suitability and threats (e.g., habitat loss and degradation, increased edge habitat, water quality) and other variables that may impact their long-term persistence in the State and to provide information needed for determining causes of population declines and understanding metapopulation dynamics.

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.29 Encourage government agencies and conservation partners to engage science community in the study of interactions among aquaculture, SGCN, their habitats, and potential impacts on migratory shorebirds and horseshoe crabs.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.18 Using baseline and monitoring data, develop a plan and seek funding for the removal of horseshoe crab impingement hazards.

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

9.3.3 Habitat management planning

9.3.3.14 Develop a management plan using aquaculture practices in coastal areas that are compatible with the recovery of SGCN.

9.3.3.30 Using baseline and monitoring data, develop a plan and seek funding for the removal of horseshoe crab impingement hazards.

100 Law and Policy

100.3 State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100.4 State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Job 28.02. Improve the Derelict Pot Reporting System (Crab, Lobster, and Fish)

Objective: Improve the harvest reporting system by creating a stipulation in the NJ Bureau of Marine Fisheries commercial licensing that requires crabbers and fishermen to report number and location of lost pots at the end of each harvest season.

Purpose: Minimize by-catch as a result of derelict crab pots (and other pots) by documenting their locations and developing removal strategies.

Benefits: Improve documentation efforts regarding the number, type, and location of fishing gear lost annually in the NJ pot fishery, and as such, reduce search time and cost associated with finding and retrieving/removing lost gear.

Focal wildlife species benefitting from this job

Fish

Alewife	Atlantic Sturgeon	Blueback Herring
Shortnose Sturgeon		

Reptiles & Amphibians

Atlantic Green Turtle	Atlantic Leatherback	Atlantic Loggerhead
Atlantic Ridley	Northern Diamondback Terrapin	

Threats and Action Drivers associated with this conservation need

12 Resource Management Needs

12.4 Internal Policy & Procedures Reform

12.4.0 State Policy and Procedure Reform

12.4.0.4 Lack of a mandatory reporting system for lost crab traps threatens diamondback terrapins and other marine species due to persistent trapping/attraction of organisms by ghost pots.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.23 Work with the NJ Division of Fish and Wildlife's Bureau of Marine Fisheries, local recreational and commercial fisheries associations, and fishers to develop a process that encourages fishermen to report the number and location of lost pots to the appropriate state agency/agencies at the end of the harvest season.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

100 Law and Policy

100.3 State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.30 Amend the NJ Bureau of Marine Fisheries commercial licensing and harvest reporting system to require fishermen to report the number and location of lost pots to the appropriate state agency/agencies at the end of the harvest season.

Job 28.03. Fisheries Gear Characterization and Interactions

Objective: Develop a matrix that lists every commercial and recreational fishery that operates in NJ state waters including data regarding fishing seasons, gear descriptions, and the locations and number of fishers.

Purpose: Obtain the necessary data regarding commercial and recreational fisheries to determine/characterize threats to SGCN (e.g., Diamondback Terrapins) and sensitive habitats.

Benefits: Provide critical information pertaining to fishery interactions over time and help drive fishery management measures that are designed and implemented to minimize bycatch of SGCN species (e.g. Diamondback Terrapin).

Focal wildlife species benefitting from this job

Fish

Alewife | Atlantic Sturgeon | Blueback Herring

Shortnose Sturgeon

Mammals

North Atlantic Right Whale

Reptiles & Amphibians

Atlantic Green Turtle | Atlantic Leatherback | Atlantic Loggerhead

Atlantic Ridley | Northern Diamondback Terrapin

Threats and Action Drivers associated with this conservation need

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory

12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.2 Lack of up-to-date existing information

12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

3 Data Collection and Analysis

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.27 Develop a matrix that lists every commercial and recreational fishery and aquaculture facility that operates in state waters and for each fishery listed, provide details regarding their fishing seasons, gear descriptions, locations and number of fishers. Add a GIS component to overlay species of concern and sensitive areas.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

Job 28.04. Expand Fisheries Reporting

Objective: Expand fisheries (including bycatch) reporting and increase observer presence on fishing boats to assist in data collection.

Purpose: Improve the characterization of reported fisheries catch, including bycatch (sea turtles, sturgeon, alewife/blueback).

Benefits: More accurate descriptions of catch composition and improved parameter.collection from fishery-dependent data-sources.

Objective: Educate those in the fishery industry and general public regarding the potential impacts of over-harvesting and the importance of accurate harvest (including bycatch) reporting.

Purpose: Improve the characterization of reported fisheries catch, including bycatch (sea turtles, sturgeon, alewife/blueback).

Benefits: Improved collaboration and support between science and fishing industryparticipants.

Objective: Coordinate SGCN protective measures with Atlantic States Marine Fisheries Commission.

Purpose: Improve the characterization of reported fisheries catch, including bycatch (sea turtles, sturgeon, alewife/blueback).

Benefits: Improved large-scale fishery-management plans and data-collection efforts.

Focal wildlife species benefitting from this job

Fish

Alewife | Atlantic Sturgeon | Blueback Herring

Shortnose Sturgeon

Mammals

North Atlantic Right Whale

Reptiles & Amphibians

Atlantic Green Turtle | Atlantic Leatherback | Atlantic Loggerhead

Atlantic Ridley | Northern Diamondback Terrapin

Threats and Action Drivers associated with this conservation need

5 Biological Resource Use

5.4 Fishing and Harvesting of Aquatic Resources

5.4.1 Intentional Use (subsistence/small scale)

5.4.1.1 Legal but excessive harvest of SGCN and/or sensitive game species can threaten populations especially for species already suffering from multiple threats.

5.4.1.2 Overharvesting of one species may lead to detrimental impacts on another; e.g., the harvesting of horseshoe crabs reduces the food availability for migrating shorebirds dependent on crab eggs.

5.4.1.3 Collection of fish for food, bait, or aquarium trade can lead to population exploitation.

5.4.1.4 Illegal collection of aquatic and semi-aquatic wildlife can have detrimental impacts on populations.

5.4.2 Intentional Use (large scale)

5.4.2.1 Overharvesting of one species may lead to detrimental impacts on another; e.g., overharvest of menhaden affecting piscivorous birds.

5.4.2.2 Collection of fish for food, bait, or aquarium trade can lead to population exploitation.

5.4.2.3 Legal but excessive harvest of commercial SGCN species can threaten populations.

5.4.3 Unintentional effects (subsistence/small scale)

5.4.3.6 Fishing gear used by commercial fisheries results in bycatch or entanglement of non-targeted wildlife leading to injury and/or mortality.

5.4.4 Unintentional effects (large scale)

5.4.4.5 Fishing gear used by commercial fisheries results in bycatch or entanglement of non-targeted wildlife leading to injury and/or mortality.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory

12.1.1.2 Lack of information regarding the population dynamics and trends, habitat requirements and dispersal distances of the various age classes, and survivorship of SGCN throughout the State.

12.1.2 Lack of up-to-date existing information

12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

14 Education/ Outreach Needs

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions

14.2.1.3 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various coastal management practices.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

3 Data Collection and Analysis

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.27 Develop a matrix that lists every commercial and recreational fishery and aquaculture facility that operates in state waters and for each fishery listed, provide details regarding their fishing seasons, gear descriptions, locations and number of fishers. Add a GIS component to overlay species of concern and sensitive areas.

7 Law Enforcement

7.1 Law enforcement

7.1.4 Scale Unspecified

7.1.4.6 Recruit law enforcement to assist in the protection and enhancement of SGCN populations, in particular endangered species, through improved awareness of species through trainings, partnerships, and other methods. Information should include but is not limited to: 1) Issues concerning illegal collection of reptiles, 2) Persecution of rare snakes, 3) Illegal recreational activities on public lands (e.g., off-road vehicles) and their impact on wildlife, 4) Identification of sensitive areas, critical sites and/or "hot-spots" for collection.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.8 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting sportsmen's organizations and fisheries addressing the potential effects of over-harvesting wildlife and promote "catch and release".

8.1.0.9 Review the marine fish code enforcement policies relative to SGCN or sensitive game species' populations and fecundity, and amend the harvest quota or "bag limits" as needed, and address enforcement of such quotas.

8.1.0.10 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting sportsmen's organizations and fisheries, as well as public constituents, addressing the potential impacts of over-harvesting wildlife can have on the ecological system and to promote "sustainable harvest".

8.1.0.12 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting sportsmen's organizations and fisheries, as well as public constituents, addressing the unintended effects fishing gear and tackle can have on wildlife.

8.1.0.27 NJ Division of Fish and Wildlife and their Game Council, and appropriate conservation partners and other stakeholders to review the freshwater fish code relative to SGCN or sensitive game species' populations and fecundity, and support amendments to the harvest quota or "bag limits" as needed.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.1 Utilize WSFR grant funds, in combination with alternate funding sources as needed, to implement a scientific data-driven, extensive educational/outreach program targeting sportsmen's organizations and fisheries, as well as public constituents, addressing the potential impacts of over-harvesting wildlife can have on the ecological system and to promote "sustainable harvest".

8.3.0.2 Utilize WSFR grant funds, in combination with alternate funding sources as needed, to implement an extensive educational/outreach program consisting of displays, fliers, list-serve mailings, facebook posts and speaking engagements with sportsmen's organizations and fisheries, as well as public constituents, addressing the unintended effects fishing gear and tackle can have on non-target species.

8.3.0.3 Utilize WSFR grant funds, in combination with alternate funding sources as needed, to implement catch and release outreach program(s).

8.3.0.15 Develop an educational outreach program using a variety of media to ensure maximizing the distribution of information, in particular targeting sportsmen's organizations and fisheries, regarding the unintended effects fishing gear and tackle can have on non-target species.

8.3.0.16 Develop an educational outreach program using a variety of media to ensure maximizing the distribution of information, in particular targeting sportsmen's organizations and fisheries, promoting "catch and release" and the impacts excessive harvests can have on wildlife populations.

8.3.0.17 Develop an educational outreach program using a variety of media to ensure maximizing the distribution of information, in particular targeting sportsmen's organizations and fisheries, promoting "sustainable harvest" using scientific data, and garner support from constituents through this outreach.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

100 Law and Policy

100.3 State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.25 Amend the harvest quota or "bag limits" within the freshwater fish code relative to SGCN or sensitive game species' as needed.

100.3.0.27 Amend harvest, license and/or permit requirements to incorporate guidance regarding the use of gear and/or tackle and current best practices to minimize bycatch or entanglement of non-target species.

100.3.0.28 Amend harvest, license and/or permit requirements to require mandatory reporting by permittees/licensees of lost harvest gear, by-catch, and entanglement of non-target species.

100.3.0.51 Amend the harvest quota or "bag limits" within the marine fish code enforcement policies relative to SGCN or sensitive game species' as needed.

Project 29. Limiting Effects of Predators

Job 29.01. Reducing the Impacts of Predators on Beach Nesting Species

Objective: Decrease the impact of predator populations at and adjacent to critical areas for beach dependent wildlife by implementing predator management strategies, including including exclusionary tactics, aversive conditioning, and removal.

Purpose: Decreasing the predation pressure on beach dependent wildlife to result in an increase in adult survival, hatch success, and productivity.

Benefits: Increased reproductive success and survival of beach dependent wildlife.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher | Black Skimmer | Common Tern

Least Tern | Piping Plover | Red Knot

Ruddy Turnstone

Reptiles & Amphibians

Northern Diamondback Terrapin

Threats and Action Drivers associated with this conservation need

8 Invasive and Other Problematic Species, Genes and Diseases

8.1 Invasive Non-native/ Alien Species/ Diseases

8.1.4 Invasive non-native terrestrial/wetland animals

8.1.4.2 Free-roaming and feral domestic animals such as cats and dogs causes direct mortality of wildlife and disturbance to wildlife breeding and resting areas.

8.2 Problematic Native Species/Diseases

8.2.2 Named Species

8.2.2.2 Human-subsidized native species can become overabundant, increasing predation on other native wildlife and/or altering the ecological community.

Conservation actions that address Threats and Action Drivers

2 Direct Management of Natural Resources

2.13 Wildlife damage management

2.13.0 Nuisance fish and wildlife damage

2.13.0.6 Develop, implement and evaluate the effectiveness of predator-control techniques aimed at improving SGCN populations and methods to minimize the impact of those species carrying parasites or diseases that may impact SGCN (e.g., raccoon roundworm kills Allegheny woodrat).

3 Data Collection and Analysis

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.22 Evaluate the effectiveness of predator-control techniques aimed at improving SGCN populations and methods to minimize the impact of those species carrying parasites or diseases that may impact SGCN (e.g., raccoon roundworm kills Allegheny woodrat).

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.21 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation human-subsidized and/or overabundant, native species cause to local nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.1.0.22 Work with government agencies and environmental educators to develop educational resources and training programs, educate the public on the devastation invasive species cause to native nesting species, and provide expert guidance on how residents can help alleviate this threat.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.6 Develop and provide (or otherwise make publicly available) educational programs and/or materials to enlist landowners, land managers and local communities to discourage the presence of managed cat colonies and trap, neuter and release programs in wildlife habitats.

8.3.0.19 Develop an educational outreach program for the public on the devastating effects predators can have on native nesting wildlife.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.11 Develop a management plan using predator-control techniques aimed at improving SGCN populations and methods to minimize the impact of those species carrying parasites or diseases that may impact SGCN (e.g., raccoon roundworm kills Allegheny woodrat).

Project 30. Do Not Disturb the Birds

Job 30.01. Reduce Human Disturbance

Objective: Reduce, if not eliminate, disturbance related to human activities at shorebird nesting, foraging, and roosting areas.

Purpose: Provide high quality beach habitats to improve breeding shorebirds' productivity and foraging.

Benefits: Improved reproductive success for beach nesting bird species, and increased fitness and survival for all shorebirds.

Objective: Reduce, if not eliminate, disturbance related to human activities at colonial bird colonies and foraging locations.

Purpose: Provide high quality marsh and beach habitats to improve the breeding productivity of colonial waterbirds.

Benefits: Improve reproductive success for colonial waterbirds and create opportunites for new colonies or the re-establishment of inactive sites.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	Black Skimmer	Common Tern
Forster's Tern	Least Tern	Little Blue Heron
Red Knot	Ruddy Turnstone	Snowy Egret
Tricolored Heron		

Threats and Action Drivers associated with this conservation need

2 Agriculture and Aquaculture

2.4 Marine and Freshwater Aquaculture

2.4.1 Subsistence/Artisinal Aquaculture

2.4.1.5 Increased risk of persistent human disturbance from tending activities that hinder or preclude habitat use by SGCN.

2.4.2 Industrial Aquaculture

2.4.2.5 Increased risk of persistent human disturbance from tending activities that hinder or preclude habitat use by SGCN.

5 Biological Resource Use

5.2 Gathering Terrestrial Plants

5.2.2 Unintentional effects

5.2.2.1 Stepping on nests or young/hatchling animals.

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.1 Off-road vehicles (motorized and non-motorized)

6.1.1.5 Vehicle use on beaches can cause disturbance, harms breeding and foraging habitats, and can cause direct mortality of beach-nesting birds.

6.1.2 Boating

6.1.2.1 Alteration and/or degradation of aquatic habitat.

6.1.2.2 Increased disturbance to marine animals and ocean-, bay- and marsh-associated birds which can alter their behavior decreasing the likelihood of their success and/or reproduction.

6.1.3 Use of beaches

6.1.3.1 Increases disturbance to beach nesting birds that reduces nesting success, and reduces foraging and resting opportunities for a wide range of nesting and migrating shorebirds.

6.1.5 Wildlife observation and photography

6.1.5.1 Improperly conducted recreational activities may disrupt normal wildlife behaviors which can result in reduced reproductive success or survival, abandonment of critical sites, etc.

6.1.7 Other: Recreational activities (such as pyrotechnics or drones) that may disrupt normal wildlife activities, or recreation that results in transfer of pathogens deleterious to wildlife.

6.1.7.3 Drone use in areas with sensitive wildlife (e.g., nesting and foraging birds, migrating and foraging/feeding whales) can alter their behavior and can cause disturbance that impacts their reproductive and/or foraging success.

6.2 Military Exercises

6.2.1 Military exercises

6.2.1.1 Military testing and training exercises may inflict disturbance and potential physical harm to wildlife.

6.3 Work and Other Activities

6.3.1 Unauthorized research projects at significant habitats

6.3.1.3 Activities conducted without proper precautions may disturb and disrupt normal wildlife behaviors, which may impact reproductive success or survival, cause abandonment of critical sites, etc.

6.3.2 Authorized research projects at significant habitats

6.3.2.4 Activities conducted without proper precautions may disturb and disrupt normal wildlife behaviors, which may impact reproductive success or survival, cause abandonment of critical sites, etc.

6.3.3 Other "work" unrelated to research

6.3.3.2 Intensive dune and beach management (including overuse of dune fencing, sand mining, mechanical beach raking, storm clean up), reduces foraging habitat for beach nesting and migratory shorebirds, and poses risks of injury and mortality to unfledged chicks.

6.3.3.3 Beach nourishment projects create suitable habitat for beach-nesting birds in areas of high human use, increasing the likelihood of disturbance to the birds, harm to the eggs, and injury and/or mortality to chicks.

Conservation actions that address Threats and Action Drivers

2 Direct Management of Natural Resources

2.9 Living shorelines

2.9.1 Beach renourishment

2.9.1.9 Manage beaches to divert human activity away from staging areas for red knots and other migratory shorebirds during critical periods.

2.9.3 Sand dune restoration

2.9.3.7 Manage sand dunes to divert human activity away from staging areas for red knots and other migratory shorebirds during critical periods.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.27 Evaluate the effectiveness of strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals through research and monitoring. Develop and provide NJ DEP and other appropriate governing agencies/commissions a summary of findings and recommendations to improve such efforts.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.14 Develop aquaculture practices in the coastal areas that are compatible with the recovery of SGCN.

3.5.4 Fish and wildlife research, survey and management techniques

3.5.4.13 Develop/improve strategies to restrict human activity (e.g., recreational, maintenance work, etc.) from sensitive habitats/areas such as avian nesting sites, reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively), and bat hibernacula, and federal buffers for marine mammals. Methods may include, but are not limited to, managing the landscape to deter access, diverting recreational and other activities from sensitive areas during critical periods through permit processes or blocking access (trails, roads, etc.), posting (if appropriate), increasing law enforcement presence, conducting management activities at appropriate times to avoid disturbance and/or harm to wildlife (e.g., habitat management, beach raking, etc.), and decreasing noise and light pollution.

7 Law Enforcement

7.1 Law enforcement

7.1.2 National Level

7.1.2.1 Enforce regulations to protect nesting bird colonies from human disturbance.

7.1.3 Sub-national Level

7.1.3.1 Enforce slow wake zones and marine conservation area regulations to protect aquatic vegetation.

7.1.3.2 Increase the number of law enforcement officers tending to wildlife issues to a reasonable number to sufficiently cover the State and marine waters.

7.1.4 Scale Unspecified

7.1.4.2 Restrict human activity from staging areas for red knots and other migratory shorebirds through increasing law enforcement presence.

7.1.4.3 Increase law enforcement presence proximate to sensitive areas [e.g., avian nesting sites, in particular rookeries, and reptile and amphibian breeding areas (nesting or gestation/birthing and breeding pools, respectively)] to deter human activity and subsequent disturbance to SGCN.

7.1.4.6 Recruit law enforcement to assist in the protection and enhancement of SGCN populations, in particular endangered species, through improved awareness of species through trainings, partnerships, and other methods. Information should include but is not limited to: 1) Issues concerning illegal collection of reptiles, 2) Persecution of rare snakes, 3) Illegal recreational activities on public lands (e.g., off-road vehicles) and their impact on wildlife, 4) Identification of sensitive areas, critical sites and/or "hot-spots" for collection.

7.1.4.7 Increase law enforcement presence to enforce regulations governing recreational activities (e.g., the use of personal watercraft and off road vehicles, caving, rock climbing, etc.) on conserved lands and within other sensitive habitats, and discourage activities that cause harm or disturbance to vegetation, wetlands, fish and wildlife.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.7 Engage government agencies, conservation partners and other stakeholders to collaboratively develop and implement an extensive educational/outreach program targeting coastal boating and recreation communities about eelgrass/widgeongrass, their impacts on marine environments, and the value, fragility and location of submerged aquatic vegetation beds and habitats.

8.1.0.14 Engage DOD in a constructive dialogue regarding strategies to minimize or eliminate disturbances to all SGCN (i.e., beyond their federal requirements) during military activites.

8.2 Recruitment and retention activities

8.2.3 For wildlife watching

8.2.3.1 Develop and implement nature-focused tourism opportunities including wildlife viewing sites, interpretive signage highlighting unique ecosystems/habitats, and wildlife-related recreational opportunities that do not negatively impact SGCN or their habitats.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.20 Develop an educational outreach program for landowners, particularly those in the coastal and bay areas, boaters, and the general public with information about the negative impacts on marine wildlife and habitats, and steps they can implement to reduce these impacts.

8.3.0.22 Post signage in sensitive coastal habitats (e.g., bird and Diamondback Terrapin nesting areas) to educate the boating community on responsible use of these areas.

9 Planning

9.3 Species and habitat management planning

9.3.3 Habitat management planning

9.3.3.14 Develop a management plan using aquaculture practices in coastal areas that are compatible with the recovery of SGCN.

11 Technical Assistance

11.1 Environmental review

11.1.1 Review of proposed projects

11.1.1.6 Review all projects to be conducted in or adjacent to coastal wetlands and marshes, and provide recommendations on how to best avoid or reduce human disturbance at nesting colonies (for example, timing restrictions) and actions not permitted.

11.1.1.8 Review proposed research projects and permit applications, provide recommendations on how to best avoid disturbing sensitive species, and identify actions not permitted.

11.2 Technical assistance

11.2.0 Assorted technical assistance strategies

11.2.0.26 Make educational resources available to the public that encourage researchers to seek out guidance prior to finalizing proposals and submitting State permit applications to reduce potential impacts on sensitive species.

11.2.1 With individuals and groups involved in resource management decision making

11.2.1.5 Provide educational resources, training programs, and on-the-ground guidance to muncipalities, state and federal agency resource managers on tasks such as writing and integrating Beach Management Plans into other management documents.

11.2.1.6 Provide educational resources, training programs, and on-the-ground guidance to resource agencies prior to project initiation to ensure wildlife and their habitats are protected to the highest degree possible during construction, and provisions are in place for post-construction habitat use.

Job 30.02. Manage and Reduce Human Disturbance in Focal Areas

Objective: Identify and develop strategies for focal areas where habitat management and reducing human disturbance will benefit coastal avian SGCN and their habitats.

Purpose: Provide guidance to land owners, managers, and governing agencies to improve and/or restore designated habitats in focal areas for the benefit of coastal avian SGCN.

Benefits: Maximize productivity of coastal avian focal SGCN to prevent further losses in some species and help reverse population declines in others.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	Black Rail	Black Skimmer
Common Tern	Forster's Tern	Least Tern
Little Blue Heron	Northern Harrier	Piping Plover
Red Knot	Ruddy Turnstone	Snowy Egret
Tricolored Heron		

Threats and Action Drivers associated with this conservation need

2 Agriculture and Aquaculture

2.4 Marine and Freshwater Aquaculture

2.4.1 Subsistence/Artisinal Aquaculture

2.4.1.5 Increased risk of persistent human disturbance from tending activities that hinder or preclude habitat use by SGCN.

2.4.2 Industrial Aquaculture

2.4.2.5 Increased risk of persistent human disturbance from tending activities that hinder or preclude habitat use by SGCN.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.1 Lack of initial baseline inventory

12.1.1.1 Lack of information regarding the distribution, connectivity and quality of SGCN habitats throughout the State, and where habitat enhancement/restoration will benefit SGCN and other wildlife.

12.1.2 Lack of up-to-date existing information

12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

Conservation actions that address Threats and Action Drivers

3 Data Collection and Analysis

3.3 Research, survey or monitoring - habitat

3.3.1 Baseline inventory

3.3.1.5 Identify areas (through surveys/studies, literature searches, review of available data, enlistment of species experts, etc.) where habitat restoration and/or enhancement would benefit wildlife SGCN.

3.3.2 Monitoring

3.3.2.16 Evaluate the effectiveness of best management practices (BMPs), protective strategies, and guidelines for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.14 Develop aquaculture practices in the coastal areas that are compatible with the recovery of SGCN.

9 Planning

9.3 Species and habitat management planning

9.3.3 Habitat management planning

9.3.3.3 Integrate best management practices (BMPs) regarding dune and beach management into beach nesting bird management agreements with government agencies (and private landowners where necessary).

9.3.3.4 Create habitat restoration plans to repair marshes and associated beaches damaged by salt hay farm/dike abandonment for all bay shore areas currently degraded.

9.3.3.14 Develop a management plan using aquaculture practices in coastal areas that are compatible with the recovery of SGCN.

Project 31. Aquaculture, Wildlife, and Habitat

Job 31.01. The Relationship between Coastal Species and Aquaculture

Objective: Study the interactions between migratory shorebirds, horseshoe crabs, aquaculture structures, and tending activities to understand the potential impacts of such interactions, and develop and implement a plan for SGCN protection while conducting sustainable aquaculture practices.

Purpose: Create and maintain conditions in the coastal and intertidal zones that support healthy populations of migratory shorebirds and horseshoe crabs, along with sustainable aquaculture.

Benefits: Identify metrics and thresholds useful for the management of aquaculture and its conservation impacts.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	Black Skimmer	Least Tern
Piping Plover	Red Knot	Ruddy Turnstone

Reptiles & Amphibians

Northern Diamondback Terrapin

Threats and Action Drivers associated with this conservation need

2 Agriculture and Aquaculture

2.4 Marine and Freshwater Aquaculture

2.4.1 Subsistence/Artisinal Aquaculture

2.4.1.1 May degrade freshwater and intertidal habitat due to farming techniques and damage from associated structures.

2.4.1.3 Potential for increased nutrient and effluent loads.

2.4.1.5 Increased risk of persistent human disturbance from tending activities that hinder or preclude habitat use by SGCN.

2.4.1.6 Potential for aquaculture structures to create impingement/entanglement hazard and/or preclude benthic habitat use by SGCN.

2.4.2 Industrial Aquaculture

2.4.2.1 May degrade freshwater and intertidal habitat due to farming techniques and damage from associated structures.

2.4.2.3 Potential for increased nutrient and effluent loads.

2.4.2.5 Increased risk of persistent human disturbance from tending activities that hinder or preclude habitat use by SGCN.

2.4.2.6 Potential for aquaculture structures to create impingement/entanglement hazard and/or preclude benthic habitat use by SGCN.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.3 Need to answer research question

12.1.3.3 Lack of studies specific to structural shellfish aquaculture (racks, bottom cages, bottom screens, etc.) and tending activities which may adversely impact horseshoe crabs, shorebirds and other benthic-dependent species.

Conservation actions that address Threats and Action Drivers

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.21 Conduct long-term monitoring to determine the impacts of the fish and shellfish aquaculture industries on focal and non-focal SGCN and their habitats (i.e., NJ bays, estuaries, ocean areas). Assess the success of management actions implemented to minimize these impacts and make specific recommendations to the NJ DEP regarding how such management efforts may be improved to minimize harm to wildlife and their habitats.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.19 Develop, implement and evaluate aquaculture practices in coastal areas that are compatible with the recovery of SGCNs and industry needs.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.14 Develop aquaculture practices in the coastal areas that are compatible with the recovery of SGCN.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.29 Encourage government agencies and conservation partners to engage science community in the study of interactions among aquaculture, SGCN, their habitats, and potential impacts on migratory shorebirds and horseshoe crabs.

9 Planning

9.3 Species and habitat management planning

9.3.3 Habitat management planning

9.3.3.6 Develop a management plan for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

9.3.3.14 Develop a management plan using aquaculture practices in coastal areas that are compatible with the recovery of SGCN.

100 Law and Policy

100.3 State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.47 Investigate regulatory options available to direct the location of aquaculture activities in Aquaculture Development Zone 4 (Delaware Bay area) in a manner which minimizes the loss of wildlife habitats and adverse impacts to the environment.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100.4 State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Job 31.02. Improved Management for Coastal Species

Objective: Use existing and future research to develop and implement improved management plans with integrated adaptive management strategies.

Purpose: Minimize negative impacts of aquaculture, and other human activities, on coastal SGCN and their habitats.

Benefits: Adopt management plans that guide conservation of SGCN in coastal areas, and which are revised based on management and monitoring results.

Focal wildlife species benefitting from this job

Birds

Red Knot
Ruddy Turnstone

Fish

Alewife
Atlantic Sturgeon
Blueback Herring

Shortnose Sturgeon

Reptiles & Amphibians

Atlantic Green Turtle	Atlantic Leatherback	Atlantic Loggerhead
Atlantic Ridley	Northern Diamondback Terrapin	

Threats and Action Drivers associated with this conservation need

2 Agriculture and Aquaculture

2.1 Annual and Perennial Crops (non-timber)

2.1.1 Shifting Agriculture

2.1.1.4 Salt hay farming on Delaware Bay marshes, and the subsequent conversion of those farms to fully tidal marshes, results in compressed sediments that are less resilient to coastal forces of erosion and sea level rise.

2.4 Marine and Freshwater Aquaculture

2.4.1 Subsistence/Artisinal Aquaculture

2.4.1.1 May degrade freshwater and intertidal habitat due to farming techniques and damage from associated structures.

2.4.1.3 Potential for increased nutrient and effluent loads.

2.4.1.5 Increased risk of persistent human disturbance from tending activities that hinder or preclude habitat use by SGCN.

2.4.1.6 Potential for aquaculture structures to create impingement/entanglement hazard and/or preclude benthic habitat use by SGCN.

2.4.2 Industrial Aquaculture

2.4.2.1 May degrade freshwater and intertidal habitat due to farming techniques and damage from associated structures.

2.4.2.3 Potential for increased nutrient and effluent loads.

2.4.2.5 Increased risk of persistent human disturbance from tending activities that hinder or preclude habitat use by SGCN.

2.4.2.6 Potential for aquaculture structures to create impingement/entanglement hazard and/or preclude benthic habitat use by SGCN.

7 Natural Systems Modifications

7.3 Other Ecosystem Modifications

7.3.5 Poor habitat management

7.3.5.15 Lack of funding, incentives, or technical guidance resources to proactively manage land to benefit SGCN wildlife.

7.3.5.16 Lack of proactive management to preserve or maintain viable and functioning marshes for SGCN wildlife.

12 Resource Management Needs

12.1 Resource information collection needs

12.1.2 Lack of up-to-date existing information

12.1.2.1 Lack of (routine, regular, ongoing) surveys/assessments that provide up-to-date information regarding population trends or health, and/or status of fish, wildlife and/or their habitats.

15 Administrative Needs

15.2 Organizational/program planning needs

15.2.3 Need for multi-state, regional and landscape scale planning

15.2.3.1 State governance and financial structures can sometimes inhibit conservation planning and implementation at the regional and landscape-scales that are often more effective at setting priorities and meeting species and habitat conservation goals and objectives.

Conservation actions that address Threats and Action Drivers

2 Direct Management of Natural Resources

2.11 Vegetation management

2.11.0 Vegetation management strategies for terrestrial or aquatic habitat creation or restoration

2.11.0.46 Implement sediment augmentation techniques on tidal salt marshes to offset marsh subsidence and effects of sea level rise, and to stabilize tidal marsh ecosystem.

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.21 Conduct long-term monitoring to determine the impacts of the fish and shellfish aquaculture industries on focal and non-focal SGCN and their habitats (i.e., NJ bays, estuaries, ocean areas). Assess the success of management actions implemented to minimize these impacts and make specific recommendations to the NJ DEP regarding how such management efforts may be improved to minimize harm to wildlife and their habitats.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.19 Develop, implement and evaluate aquaculture practices in coastal areas that are compatible with the recovery of SGCNs and industry needs.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.14 Develop aquaculture practices in the coastal areas that are compatible with the recovery of SGCN.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.1 Coordinate research efforts among government agencies, non-government conservation partners and other stakeholders to investigate the impacts of aquaculture on migratory shorebirds, waterfowl, finfish, shellfish and other SGCN and their habitats, to determine relative effects of farming locations and aquaculture techniques, and to evaluate management actions to minimize such impacts.

9 Planning

9.3 Species and habitat management planning

9.3.1 Species management planning

9.3.1.21 Develop and implement conservation actions for issues, threats, and opportunities most effectively addressed at a regional-, multi-state-, and landscape-scales, with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans.

9.3.3 Habitat management planning

9.3.3.14 Develop a management plan using aquaculture practices in coastal areas that are compatible with the recovery of SGCN.

100 Law and Policy

100.3 State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.47 Investigate regulatory options available to direct the location of aquaculture activities in Aquaculture Development Zone 4 (Delaware Bay area) in a manner which minimizes the loss of wildlife habitats and adverse impacts to the environment.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100.4 State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Job 31.03. Incentives for Oyster Aquaculture

Objective: Target areas where intertidal structural oyster aquaculture poses risks to focal species and other SGCN's and incentivize (e.g., conservation easements, support/grants) the transition from intertidal to subtidal oyster aquaculture.

Purpose: Reduce the extent of intertidal oyster aquaculture that may have impacts on SGCN.

Benefits: Reduce impacts to coastal SGCN (e.g., migrating shorebirds) by shifting from intertidal structural aquaculture to subtidal aquaculture to reduce disturbance in intertidal habitats. Subtidal structural aquaculture largely frees oyster growers from timing restrictions on tending activities.

Objective: Incentivize (e.g., conservation easements, support/grants) consolidation of structural oysterculture into Aquaculture Development Zone 4.

Purpose: Reduce negative impacts of intertidal or subtidal aquaculture operations by limiting its extent inside localized areas.

Benefits: Reduce impacts to coastal SGCN (e.g., migrating shorebirds, horseshoe crabs, other marine SGCN), reduce fragmentation of benthic habitats, and create efficiencies for growers, public health, and law enforcement functions by clustering development of structural aquaculture operations.

Objective: Incentivize (grants, support, loans, etc.) experimentation with intertidal and subtidal structures and configurations that are permeable to migration, spawning, benthic foraging and sheltering for SGCN species (horseshoe crab, other benthic-dependent SGCN) in Delaware Bay and Atlantic Coast bays.

Purpose: Reduce negative impacts of aquaculture on coastal SGCN and their habitats.

Benefits: Maximize area, and minimize fragmentation, of intertidal habitat for SGCN while creating efficiencies for growers, public health, and law enforcement functions related to the structural aquaculture industry.

Objective: Incentivize development of non-chemical mudworm and fouling control methods that reduce intertidal aquaculture tending time and activity, and thus reduce disturbance to coastal SGCN.

Purpose: Reduce potential negative impacts of aquaculture on coastal SGCN and their habitats in Delaware Bay and Atlantic Coast bays (Red Knot, Horseshoe Crab, intertidal/benthic-dependent SGCN).

Benefits: Reduce potential disturbances to coastal SGCN in shellfish aquaculture areas.

Focal wildlife species benefitting from this job

Birds

Red Knot
Ruddy Turnstone

Reptiles & Amphibians

Northern Diamondback Terrapin

Threats and Action Drivers associated with this conservation need

2 Agriculture and Aquaculture

2.4 Marine and Freshwater Aquaculture

2.4.1 Subsistence/Artisinal Aquaculture

2.4.1.1 May degrade freshwater and intertidal habitat due to farming techniques and damage from associated structures.

2.4.1.2 Increased risk of parasite introduction into marine environments.

2.4.1.3 Potential for increased nutrient and effluent loads.

2.4.1.4 Potential increased noise pollution.

2.4.2 Industrial Aquaculture

2.4.2.1 May degrade freshwater and intertidal habitat due to farming techniques and damage from associated structures.

2.4.2.2 Increased risk of parasite introduction into marine environments.

2.4.2.3 Potential for increased nutrient and effluent loads.

2.4.2.4 Potential increased noise pollution.

Conservation actions that address Threats and Action Drivers

1 Coordination and Administration

1.2 Incentives

1.2.1 Incentives

1.2.1.25 Create incentives (non-monetary and/or monetary) within State regulations to assist and programs to deliver those incentives to aquaculture growers to relocate, for example, from intertidal to subtidal lease areas through buyouts of leases or microloans, and/or promoting on-lease conservation measures used by aquaculture growers (such as the implementation of conservation easements, use of living shorelines, incorporation of BMPs for habitat protection, etc.) for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

Job 31.04. Integrated Multi-Trophic Aquaculture

Objective: Develop and implement practices for citing and management of aquaculture operations (all types) that reduce the risks of nutrient concentration or eutrophication.

Purpose: Reduce overall nutrient inputs from aquaculture by citing appropriate aquaculture types in appropriate areas based on, but not limited to, nutrient loading, tidal range and tidal flushing capacity; (e.g., oysters in Delaware Bay). Consider appropriate scale (acres) of aquaculture operations relative to conditions within individual bays and cumulative inputs by region (e.g., tidal drainage). Citing of native fish aquaculture (excess nutrients, entanglement, other impacts) should be carefully considered before placement in state waters.

Benefits: Reduce risks of eutrophication; improve water quality and clarity, preserve important aquatic vegetation habitats, improve water quality for native bivalve aquaculture.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	Black Skimmer	Least Tern
Red Knot	Ruddy Turnstone	

Fish

Alewife	Atlantic Sturgeon	Blueback Herring
Bridle Shiner	Brook Trout	Comely Shiner
Ironcolor Shiner	Shortnose Sturgeon	

Reptiles & Amphibians

Atlantic Green Turtle	Atlantic Leatherback	Atlantic Loggerhead
Atlantic Ridley	Northern Diamondback Terrapin	

Threats and Action Drivers associated with this conservation need

2 Agriculture and Aquaculture

2.4 Marine and Freshwater Aquaculture

2.4.1 Subsistence/Artisinal Aquaculture

2.4.1.3 Potential for increased nutrient and effluent loads.

2.4.2 Industrial Aquaculture

2.4.2.3 Potential for increased nutrient and effluent loads.

Conservation actions that address Threats and Action Drivers

3 Data Collection and Analysis

3.0 General fish and wildlife research, survey or monitoring

3.0.0 Research, survey or monitoring - general fish and wildlife needs

3.0.0.21 Conduct long-term monitoring to determine the impacts of the fish and shellfish aquaculture industries on focal and non-focal SGCN and their habitats (i.e., NJ bays, estuaries, ocean areas). Assess the success of management actions implemented to minimize these impacts and make specific recommendations to the NJ DEP regarding how such management efforts may be improved to minimize harm to wildlife and their habitats.

3.2 Research, survey or monitoring - fish and wildlife populations

3.2.0 Data deficiency

3.2.0.19 Develop, implement and evaluate aquaculture practices in coastal areas that are compatible with the recovery of SGCNs and industry needs.

3.5 Techniques development

3.5.3 Habitat restoration methods

3.5.3.12 Develop management actions to minimize the documented adverse impacts and reduce risks of potential adverse impacts of aquaculture on migratory shorebirds and other SGCN, including waterfowl, finfish, and shellfish and their habitats.

3.5.3.14 Develop aquaculture practices in the coastal areas that are compatible with the recovery of SGCN.

9 Planning

9.3 Species and habitat management planning

9.3.3 Habitat management planning

9.3.3.6 Develop a management plan for maintaining and enhancing healthy, SGCN-associated terrestrial and aquatic habitats and associated riparian habitats, and to minimize (if not avoid) incidental take of resident and migratory fish and wildlife and/or disturbance to them (in particular during breeding periods) on public and private lands for maintaining populations in perpetuity.

9.3.3.14 Develop a management plan using aquaculture practices in coastal areas that are compatible with the recovery of SGCN.

100 Law and Policy

100.3 State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.23 Review existing CAFRA regulations and ensure that the Coastal Zone Management Rules (NJAC 7:7E) adequately address mitigation that creates an environmental benefit for losses of SGCN and their habitats.

100.3.0.47 Investigate regulatory options available to direct the location of aquaculture activities in Aquaculture Development Zone 4 (Delaware Bay area) in a manner which minimizes the loss of wildlife habitats and adverse impacts to the environment.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100.4 State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.25 Develop policies that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

Job 31.05. Zoning: Leave Room for Wildlife

Objective: Minimize impacts of native bivalve aquaculture practices (oysters, clams, mussels, etc.) and facilities on coastal species by zoning the aquaculture industry within clustered locations in each proposed embayment and thereby allowing for long-term study of SGCN impacts, development of best management practices or mitigation, while preserving a larger zone solely for habitat preservation and restoration.

Purpose: Reduce potential negative impacts of intertidal and subtidal bivalve aquaculture operations by clustering in discrete and limited areas.

Benefits: Maximize the area and minimize fragmentation of intertidal and subtidal coastal habitats used by SGCN (e.g., migratory shorebirds, horseshoe crabs, benthic-dependent SGCN) while creating efficiencies for bivalve growers, public health, and law enforcement functions by clustering structural aquaculture development.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	Black Skimmer	Least Tern
Red Knot	Ruddy Turnstone	

Fish

Alewife	Atlantic Sturgeon	Blueback Herring
Bridle Shiner	Brook Trout	Comely Shiner
Ironcolor Shiner	Shortnose Sturgeon	

Reptiles & Amphibians

Atlantic Green Turtle	Atlantic Leatherback	Atlantic Loggerhead
Atlantic Ridley	Northern Diamondback Terrapin	

Threats and Action Drivers associated with this conservation need

2 Agriculture and Aquaculture

2.4 Marine and Freshwater Aquaculture

2.4.1 Subsistence/Artisinal Aquaculture

2.4.1.1 May degrade freshwater and intertidal habitat due to farming techniques and damage from associated structures.

2.4.1.3 Potential for increased nutrient and effluent loads.

2.4.2 Industrial Aquaculture

2.4.2.1 May degrade freshwater and intertidal habitat due to farming techniques and damage from associated structures.

2.4.2.3 Potential for increased nutrient and effluent loads.

Conservation actions that address Threats and Action Drivers

100 Law and Policy

100.3 State Regulations

100.3.0 Regulatory initiatives for species and habitat protection

100.3.0.47 Investigate regulatory options available to direct the location of aquaculture activities in Aquaculture Development Zone 4 (Delaware Bay area) in a manner which minimizes the loss of wildlife habitats and adverse impacts to the environment.

100.3.0.72 Develop regulations that require permit applicants and/or review agencies to assess the cumulative and synergistic effects of a proposed project (i.e., "secondary effects"), both over time and over a larger spatial scale than the site itself.

100.4 State Agency Policy Integration

100.4.0 Policy initiatives for species and habitat protection

100.4.0.4 Create a policy that requires the use of wildlife habitat and corridor mapping products for both regulatory use when conducting project reviews and planning/siting new or expanded rights-of-way projects.

Project 32. Education and Outreach

Job 32.01. Wildlife Observer Ethics

Objective: Reduce human disturbances to wildlife by encouraging wildlife observers and photographers to exercise appropriate and ethical behavior.

Purpose: Reduce human disturbance to wildlife.

Benefits: Eliminating human disturbances will result in improved reproductive and foraging success for wildlife and decreased destruction of/disturbance to important habitats within locations targeted by observers and photographers.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	Black Rail	Black Skimmer
Common Tern	Forster's Tern	Least Tern
Little Blue Heron	Northern Harrier	Peregrine Falcon
Pied-billed Grebe	Piping Plover	Red Knot
Ruddy Turnstone	Snowy Egret	Tricolored Heron

Reptiles & Amphibians

Corn Snake	Eastern Hognose Snake	Northern Black Racer
Northern Pine Snake	Northern Scarlet Snake	Timber Rattlesnake

Threats and Action Drivers associated with this conservation need

6 Human Intrusions and Disturbance

6.1 Recreational Activities

6.1.5 Wildlife observation and photography

6.1.5.1 Improperly conducted recreational activities may disrupt normal wildlife behaviors which can result in reduced reproductive success or survival, abandonment of critical sites, etc.

Conservation actions that address Threats and Action Drivers

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.42 Engage citizens, wildlife observers and photographers through discussions and distributable information regarding the importance of and encouraging implementing responsible and ethical behavior when observing wildlife by developing an alliance of wildlife photographers and widely circulating recommendations on how to reduce impact.

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.13 Conduct an educational campaign to encourage observer ethics and respect for wildlife and natural habitat.

Job 32.02. Environmental Education in the Core Curriculum

Objective: Initiate legislative action to require schools (grades k-12) to provide environmental education regarding wildlife and their habitats and how students can be thoughtful stewards.

Purpose: Recruit and inspire future generations to become thoughtful stewards of wildlife and natural landscapes.

Benefits: Creation of school yard habitat, inspiring backyard habitat, and cultivating new generations of stewards and outdoor recreationists which in turn increases public support of natural resources and wildlife conservation.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	American Woodcock	Black Rail
Black Skimmer	Blue-winged Warbler	Bobolink
Cerulean Warbler	Common Tern	Eastern Meadowlark
Forster's Tern	Golden-winged Warbler	Grasshopper Sparrow
Kentucky Warbler	Least Tern	Little Blue Heron
Northern Bobwhite	Northern Harrier	Peregrine Falcon
Pied-billed Grebe	Piping Plover	Prothonotary Warbler
Red Knot	Red-headed Woodpecker	Ruddy Turnstone
Scarlet Tanager	Snowy Egret	Tricolored Heron
Vesper Sparrow	Wood Thrush	

Fish

Alewife	Atlantic Sturgeon	Banded Sunfish
Blackbanded Sunfish	Blueback Herring	Bridle Shiner
Brook Trout	Comely Shiner	Ironcolor Shiner

Mud Sunfish	Shortnose Sturgeon	Swamp Darter

Macroinvertebrates

A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper
Ashton Cuckoo Bumble Bee	Brook Floater	Buchholz's Dart Moth
Buchholz's Gray	Carter's Noctuid Moth	Daecke's Pyralid Moth
Dotted Skipper	Dwarf Wedgemussel	Eastern Lampmussel
Frosted Elfin	Georgia Satyr	Green Floater
Hoary Elfin	Leonard's Skipper	Little White Tiger Beetle
Maritime Sunflower Borer Moth	New England Bluet	New Jersey Pine Barrens Tiger Beetle
Northeastern Beach Tiger Beetle	Northern Metalmark	Papaipema harrisii
Pine Barrens Bluet	Pink Sallow	Robust Baskettail
Rusty Patched Bumble Bee	Sand Myrtle Looper/Pink	Scarlet Bluet
Septima's Clubtail	Southeastern Beach Tiger Beetle	Southern Plains Bumble Bee
Superb Jewelwing	Triangle Floater	Variable Cuckoo Bumble Bee
Yellow Bumble Bee	Yellow Lampmussel	Yellow-banded Bumble Bee

Mammals

Allegheny Woodrat	Indiana Bat	Little Brown Bat
North Atlantic Right Whale	Northern Myotis	

Reptiles & Amphibians

Atlantic Green Turtle	Atlantic Leatherback	Atlantic Loggerhead
Atlantic Ridley	Bog Turtle	Carpenter Frog
Corn Snake	Eastern Box Turtle	Eastern Hognose Snake
Eastern Redbelly Turtle	Eastern Spadefoot	Eastern Tiger Salamander
Longtail Salamander	New Jersey Chorus Frog	Northern Black Racer
Northern Diamondback Terrapin	Northern Pine Snake	Northern Red Salamander
Northern Scarlet Snake	Pine Barrens Treefrog	Timber Rattlesnake
Wood Turtle		

Threats and Action Drivers associated with this conservation need

14 Education/ Outreach Needs

14.1 Education needs

14.1.1 Need for improved knowledge of fish and wildlife and their habitats

14.1.1.1 Lack of understanding of the importance of various SGCN habitats, their connectivity to similar habitats, and how planning decisions impact their quality and the wildlife that depend upon them.

14.1.1.2 Lack of general knowledge of SGCN life histories and vulnerabilities as they relate to land management practices.

Conservation actions that address Threats and Action Drivers

4 Education

4.1 Educator/Instructor training

4.1.0 Public education

4.1.0.1 Provide educational resources and training programs to private and public landowners, as well as schools, regarding the benefits and creation of backyard habitats for wildlife.

4.1.1 Aquatic resource education

4.1.1.1 Provide educational resources and training programs to teachers in aquatic resource education that includes information regarding climate change and sea-level rise for incorporation into the class curriculum and/or as the focus of school field trips.

4.1.1.2 Provide educational resources and training programs to teachers in aquatic resource education that includes information regarding how coastal stabilization negatively impacts wildlife by preventing natural processes for incorporation into the class curriculum and/or as the focus of school field trips.

8 Outreach

8.1 Partner/stakeholder engagement

8.1.0 Partner/stakeholder engagement strategies

8.1.0.34 Work with the NJ Education Association and Department of Education to design curriculum and outdoor experimental learning opportunities, and provide training to teachers on implementation of these activities.

Job 32.03. Wildlife and Sportfish Restoration Outreach and Awareness

Objective: Promote awareness of this funding source among hunters, anglers, and the general public, for wildlife and habitat conservation through product labeling, websites, public service announcements, and signage (or other recognition) at places that have benefited.

Purpose: Increase participation in outdoor recreation that ties people to the land and the work done to preserve it, and unite the conservation philosophies of hunter/angler and non-sportsmen communities.

Benefits: Improve public awareness of conservation that enhances wildlife, habitats, and functioning ecosystems, and provide informative signage and educational opportunities to the public.

Focal wildlife species benefitting from this job

Birds

American Oystercatcher	American Woodcock	Black Rail
Black Skimmer	Blue-winged Warbler	Bobolink
Cerulean Warbler	Common Tern	Eastern Meadowlark
Forster's Tern	Golden-winged Warbler	Grasshopper Sparrow
Kentucky Warbler	Least Tern	Little Blue Heron
Northern Bobwhite	Northern Harrier	Peregrine Falcon
Pied-billed Grebe	Piping Plover	Prothonotary Warbler
Red Knot	Red-headed Woodpecker	Ruddy Turnstone
Scarlet Tanager	Snowy Egret	Tricolored Heron
Vesper Sparrow	Wood Thrush	

Fish

Alewife	Atlantic Sturgeon	Banded Sunfish
Blackbanded Sunfish	Blueback Herring	Bridle Shiner
Brook Trout	Comely Shiner	Ironcolor Shiner
Mud Sunfish	Shortnose Sturgeon	Swamp Darter

Macroinvertebrates

A Notodontid Moth (H. varia)	American Bumble Bee	Arogos Skipper
Ashton Cuckoo Bumble Bee	Brook Floater	Buchholz's Dart Moth
Buchholz's Gray	Carter's Noctuid Moth	Daecke's Pyralid Moth
Dotted Skipper	Dwarf Wedgemussel	Eastern Lampmussel
Frosted Elfin	Georgia Satyr	Green Floater
Hoary Elfin	Leonard's Skipper	Little White Tiger Beetle
Maritime Sunflower Borer Moth	New England Bluet	New Jersey Pine Barrens Tiger Beetle
Northeastern Beach Tiger Beetle	Northern Metalmark	Papaipema harrisii

Pine Barrens Bluet	Pink Sallow	Robust Baskettail
Rusty Patched Bumble Bee	Sand Myrtle Looper/Pink	Scarlet Bluet
Septima's Clubtail	Southeastern Beach Tiger Beetle	Southern Plains Bumble Bee
Superb Jewelwing	Triangle Floater	Variable Cuckoo Bumble Bee
Yellow Bumble Bee	Yellow Lampmussel	Yellow-banded Bumble Bee

Mammals

Allegheny Woodrat	Indiana Bat	Little Brown Bat
North Atlantic Right Whale	Northern Myotis	

Reptiles & Amphibians

Atlantic Green Turtle	Atlantic Leatherback	Atlantic Loggerhead
Atlantic Ridley	Bog Turtle	Carpenter Frog
Corn Snake	Eastern Box Turtle	Eastern Hognose Snake
Eastern Redbelly Turtle	Eastern Spadefoot	Eastern Tiger Salamander
Longtail Salamander	New Jersey Chorus Frog	Northern Black Racer
Northern Diamondback Terrapin	Northern Pine Snake	Northern Red Salamander
Northern Scarlet Snake	Pine Barrens Treefrog	Timber Rattlesnake
Wood Turtle		

Threats and Action Drivers associated with this conservation need

14 Education/ Outreach Needs

14.2 Outreach needs

14.2.1 Need to improve specific understanding of agency/organization goals, objectives and ongoing wildlife conservation actions

14.2.1.1 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various forest management practices.

14.2.1.2 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various aquatic and riparian management practices.

14.2.1.3 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various coastal management practices.

14.2.1.4 Need to develop greater understanding of and support for efforts implemented to maintain disturbance-free habitats that allow coastal wildlife populations to thrive alongside human residential and recreational uses.

14.2.1.5 Need to develop greater understanding of and support for efforts implemented to enhance SGCN habitat and biodiversity through various wetland management practices.

Conservation actions that address Threats and Action Drivers

8 Outreach

8.3 WSFR program/subprogram outreach

8.3.0 WSFR program/subprogram outreach strategies

8.3.0.12 Promote awareness of WSFR (Wildlife and Sportfish Restoration) Outreach/Awareness grants, an important funding source for conservation among hunters and anglers as well as the general public.

This page intentionally left blank

Appendix L: Action Development Workshops' Invitees & Attendance

Action Development Workshops' Invitees & Attendance

(Meeting dates: 7/16/15, 7/22/15, 7/27/15)

Organization	Attended
Business or corporate organizations:	
Atlantic City Electric	Yes
Buttonbush Design and Delineation	Yes
Oysters Crabs and Soft Crabs	Yes
PSEG Services Corporation	Yes
Unaffiliated private consultants	Yes
Natural Resource Planning and Environmental Consulting	No
Nonprofit conservation or planning organizations:	
D&R Greenway Land Trust	Yes
Conserve Wildlife Foundation of New Jersey	Yes
Western Hemisphere Shorebird Reserve Network	Yes
National Fish and Wildlife Foundation	No
Hunterdon Land Trust	No
Center for Aquatic Sciences Adv. Aquarium	No
Great Egg Harbor Watershed Association	Yes
Monmouth Conservation Foundation	Yes
South Jersey Resource Conservation and Development	Yes
SandyHook SeaLife Foundation	No
Monmouth County Audubon Society	Yes
Pinelands Preservation Alliance	Yes
The Nature Conservancy	Yes
The Wetlands Institute	Yes
New Jersey Audubon	Yes
New Jersey Conservation Foundation	Yes
Local, State or federal government:	
ENSAC	Yes
Monmouth County Park System	Yes
Morris County Park Commission	Yes
New Jersey Pinelands Commission	Yes
New Jersey Shellfish Council - Atlantic Coast	No
New Jersey Shellfish Council - Delaware Bay	Yes
NJ DEP DFW Bureau of Land Management	Yes
NJ DEP DFW Bureau of Marine Fisheries	Yes
NJ DEP DFW Bureau of Shellfisheries	Yes
NJ DEP DFW Endangered and Nongame Species Program	Yes
NJ DEP Division of Land Use Regulation	Yes
NJ DEP DPF Office of Natural Lands Management	Yes
NJ DEP DPF State Forestry Services	Yes
NJ DEP Land Use Management	Yes
NJ DEP Office of Science	Yes
NJ Department of Transportation	Yes
NOAA Fisheries Service	Yes
US Fish and Wildlife Service	Yes
US Fish and Wildlife Service - E.B. Forsythe NWR	Yes
U.S. Fish and Wildlife Service - Wallkill River NWR	Yes
USDA NRCS	Yes
USDA Wildlife Services - APHIS	No
Academia	
Rowan University	Yes
Rutgers University	Yes
Stockton University	Yes
Stockton University - Coastal Research Center	Yes
Monmouth University - Urban Coast Institute	Yes

Appendix M: USFWS TRACS Indicators to Measure Success of Conservation Actions

Wildlife TRACS Project Action Levels with Indicators 8/20/14

Project Level	Action Level 1	Action Level 2	Action Level 3	Level 2 and Level 3 Output Measures	Description/Examples/Notes
Project Catagories	**Category**	**Strategy**	**Activity**	**Units**	
Administration and/or Conservation / Management and/or Recreation	Coordination and Administration	Coordination and Administration		Number	Coordination and administration necessary for effective agency operations and program/project management
			Agency administrative support	Number	Administration necessary for effective agency operations (e.g., acquisition of goods and services, human resources tasks)
			Program/project administrative support	Number	Administration necessary for effective program/project management (e.g., staff support and training, monitoring progress of grant proposal and reporting processes)
		Incentives	Incentives	Number	Development and delivery of economic incentives to private landowners to influence responsible stewardship of land/water and specific species
	Direct Management of Natural Resources				
		Create new habitat or natural processes		Acres	Creation of new habitat or natural processes for the benefit of fish and wildlife and recreational users
			Habitat conversion	Acres	Conversion of one type of habitat into another (e.g., creating bottomland forest from agricultural land, wetland creation) Note: Forest and wetland would be the appropriate broad habitat types to code for these two examples
			Public fishing lake construction	Acres	Construction of new public fishing lakes
			Waterfowl impoundment creation	Acres	Creation of shallow water impoundments for the primary benefit of waterfowl
		Dam and barrier removal		Structures	Removal of barriers to maintain aquatic species populations and restore ecological functions in streams (e.g., dam or dike removal, notching of dams)
			Culvert work	Structures	Replacement or repair of road culverts (e.g., installing larger culvert, eliminating perching)
			Dam notching	Structures	Removal of portions of dams for increased flow

NOTE: The asterix (*) denotes required activity level data

Wildlife TRACS Project Action Levels with Indicators 8/20/14

Project Level	Action Level 1	Action Level 2	Action Level 3	Level 2 and Level 3 Output Measures	Description/Examples/Notes
			Dam removal	Structures	Removal of entire dams
			Road crossing removal	Structures	Removal of in-stream road crossings
			Obstruction removal	Structures	Removal of other obstructions (e.g., beaver dams)
		Fire management		Acres	Use of fire to benefit fish and wildlife and their habitats
			Firebreak	Acres	Creation or maintenance of a strip of cleared or plowed land used to stop the spread of a fire
			Fuel reduction	Acres	Application of treatments to reduce the risk of high-severity wildfires and to manage changes in the ecological functions of forests (e.g., mechanical thinning)
			Prescribed burning	Acres	Application of fire in a knowledgeable manner to forest fuels on a specific land under selected weather conditions to accomplish predetermined, well-defined management objectives (e.g., burning an established native grass community to reduce or eliminate invading brush or exotic species)
		Fish and wildlife habitat structures		Structures	Installation of structures to benefit fish and wildlife and their habitats
			Artificial reef development	Structures	Development of artificial reefs in freshwater or marine environments for aquatic species spawning, foraging and refugia
			Hibernacula	Structures	Creation or improvement of overwintering sites
			Nesting habitat improvements	Structures	Installation of nesting structures (e.g., wood duck boxes, osprey platforms)
			Wildlife escape structures	Structures	Installation of structures that allow wildlife to escape from man-made devices placed in the environment (e.g., ramps that allow sage grouse to escape from livestock watering troughs)
				Acres	Improvements to agricultural practices to benefit fish and wildlife and their habitats
			Alley cropping/silvopasture	Acres	Methods of planting in which perennial, preferably leguminous trees or shrubs, are grown simultaneously with an arable crop

NOTE: The asterix (*) denotes required activity level data

Wildlife TRACS Project Action Levels with Indicators 8/20/14

Project Level	Action Level 1	Action Level 2	Action Level 3	Level 2 and Level 3 Output Measures	Description/Examples/Notes
		Grazing/farm management	Farming residue management	Acres	Use of vegetative crop material left on a field after harvesting, pruning or processing to benefit wildlife and soil quality
			Forage use management	Acres	Management of timing and duration of grazing to maintain adequate cover for range health and nesting success (e.g., establishment of rotational grazing system to improve grassland nesting bird habitat)
			Livestock heavy use area establishment	Acres	Provision of stable, non-eroding surfaces for areas intensively used by livestock to protect and improve water quality
			Livestock stream crossing	Acres	Installation of structures that allow livestock to cross a stream in a safe and environmentally sound manner (e.g., fords, culverts, bridges)
			Nutrient or runoff management system	Acres	Application of techniques to minimize nutrient runoff from agricultural operations
			Riparian fence installation	Acres	Installation of fences along riparian areas to keep out livestock
			Waste storage/treatment	Acres	Management of on-farm generated wastes in an environmentally responsible manner (e.g., liquid retention and storage ponds, anerobic waste treatment lagoons)
		Hazard or infrastructure removal		Acres	Removal of hazards or infrastructure to benefit fish and wildlife and their habitats
			Building removal	Acres	Removal of buildings to improve habitat for wildlife
			Degraded land reconstruction	Acres	Reconstruction of degraded land to benefit wildlife (e.g., abandoned mine area recovery, deleveling)
			Derelict gear (net/pot) removal	Acres	Removal of derelict fishing gear from waters to prevent continued capture of aquatic species (e.g., fishing nets, fish/crab pots)
			Pavement removal	Acres	Removal of pavement to improve habitat for wildlife (e.g., roads, airplane runways)
			Pier/dock removal	Acres	Removal of piers or docks to improve aquatic habitats

NOTE: The asterix (*) denotes required activity level data

Wildlife TRACS Project Action Levels with Indicators 8/20/14

Project Level	Action Level 1	Action Level 2	Action Level 3	Level 2 and Level 3 Output Measures	Description/Examples/Notes
			Shoreline armoring removal	Acres	Removal of shoreline armoring to improve aquatic habitats (e.g., jetties, riprap)
			Solid waste removal	Acres	Removal of solid waste to improve habitat for wildlife (e.g., derelict vehicles, rubbish)
		Instream modification		Miles	Stream improvements to benefit fish and wildlife and their habitats
			Channel reconfiguration	Miles	Restoration of natural stream channel (e.g., returning meanders and sustainable profiles to straightened streams, sandbar improvement)
			Channel structure placement	Miles	Placement of structures within streams to restore natural characteristics (e.g., cross vanes, boulders)
			Nutrient improvement	Miles	Application of nutrients to improve water quality of fish and wildlife (e.g., liming of streams, carcass placement)
			Spawning by-pass channels	Miles	Construction of side channel fish spawning and rearing habitat
			Spawning gravel placement	Miles	Addition of gravel to streams to improve spawning areas
			Streambank stabilization	Miles	Stabilization of streambanks (e.g., bank armoring, bank bioengineering)
		Invasive species control		Acres	Control of invasive animal and plant species to maintain native species populations and restore ecological functions
			Animal - biological	Acres	Control of invasive animal species by biological means (e.g., introducing predators to control invasive animal species)
			Animal - chemical	Acres	Control of invasive animal species by chemical means (e.g., piscicide treatment of sea lamprey in inland waters)
			Animal - mechanical	Acres	Control of invasive animal species by mechanical means (e.g., constructing a barrier in a stream to prevent entry of invasive fish species)
			Plant - biological	Acres	Control of invasive plant species by biological means (e.g., using beetles to control purple loosestrife)

NOTE: The asterix (*) denotes required activity level data

Wildlife TRACS Project Action Levels with Indicators 8/20/14

Project Level	Action Level 1	Action Level 2	Action Level 3	Level 2 and Level 3 Output Measures	Description/Examples/Notes
			Plant - chemical	Acres	Control of invasive plant species by chemical means (e.g., herbicide treatment of invasive plant species)
			Plant- mechanical	Acres	Control of invasive plant species by mechanical means (e.g., hand pulling of invasive plant species)
		Living shorelines		Acres	Physical manipulation in shoreline areas to maintain fish and wildlife habitats and/or restore ecological functions
			Beach renourishment	Acres	Placement of sand onto beaches and employing other techniques for their renourishment
			Erosion control structures	Acres	Installation of hard structures (e.g., seawall bulkhead) or living structures (e.g., greenwall systems) to control erosion
			Sand dune restoration	Acres	Application of techniques to restore sand dunes (e.g., fencing off sea-grass areas)
		Planting/seeding		Acres	Planting or seeding to maintain fish and wildlife habitats and/or restore ecological functions
			Coral	Acres	Application of techniques to reestablish coral reefs
			Field border/hedgerow	Acres	Maintenance or establishment of edge between two vegetation types
			Food plots	Acres	Planting crops specifically as food for wildlife
			Herbaceous vegetation	Acres	Planting/seeding of grasslands
			Mulching	Acres	Application of organic materials to enrichment and protect soil
			Plant propagation/nursery	Acres	Use of nurseries to raise plants for habitat improvement
			Submerged aquatic vegetation	Acres	Restoration of vegetation that lives at or below the water surface
			Trees/shrubs	Acres	Planting trees or shrubs
			Vegetation buffer	Acres	Maintenance or establishment of strips of land with permanent vegetation to intercept stormwater runoff and minimize soil erosion
			Woody debris	Acres	Placement of limbs, bush, trees and stumps to improve habitat
				Acres	Physical manipulation of vegetation to maintain fish and wildlife habitats and/or restore ecological functions

NOTE: The asterix (*) denotes required activity level data

Wildlife TRACS Project Action Levels with Indicators 8/20/14

Project Level	Action Level 1	Action Level 2	Action Level 3	Level 2 and Level 3 Output Measures	Description/Examples/Notes
		Vegetation management	Chaining	Acres	Dragging heavy chains to remove unwanted vegetation
			Clearing and snagging	Acres	Use of varied techniques to clear vegetation (e.g., brush shearing to set back early successional plant communities)
			Dixie harrow/Lawson aerator	Acres	Removal of vegetation and treating soil by pulling devices behind a tractor (e.g., removing sagebrush for improved herbaceous cover for sage grouse)
			Forest stand improvement	Acres	Removal of trees to improve forest habitat for wildlife (e.g., forest management that promotes a particular serial stage)
			Mowing	Acres	Cutting down grass or grain to maintain habitat for wildlife
			Plowing/Discing	Acres	Plowing or other mechanical means of disturbing existing vegetation and exposing soil
		Water management		Number	Management of water to benefit fish and wildlife and their habitats
			Ditch plugs	Number	Installation of earthen plugs into drainage ditches to restore wetlands
			Diversion/headgate	Number	Installation or maintenance of structures to divert water
			Drainage	Number	Removal of tile drains or drainage ditches to restore wetland hydrology
			Public fishing lake enhancement	Number	Enhancements made to public fishing lakes (e.g., installation of aerators)
			Spring development	Number	Application of techniques to improve the flow, quantity and yield of water from a natural spring
			Tide gate	Number	Installation or maintenance of structures to increase the hydro-period and water depth of a wetland
			Waterfowl impoundment maintenance	Number	Maintenance of impoundments for waterfowl habitat (e.g., renovation of impoundment dikes)
			Water control structure	Number	Installation or maintenance of structures to simulate natural hydrological processes
			Watering facilities	Number	Installation or maintenance of structures to collect and store water for the benefit of wildlife (e.g., water holes, guzzlers, wells)

NOTE: The asterix (*) denotes required activity level data

Wildlife TRACS Project Action Levels with Indicators 8/20/14

Project Level	Action Level 1	Action Level 2	Action Level 3	Level 2 and Level 3 Output Measures	Description/Examples/Notes
		Wildlife damage management		Interventions	Assessment and management of damage from nuisance native fish and wildlife. Includes control of predators by biological, chemical or mechanical means to maintain populations of species at risk and restore ecological functions (e.g., gull or cormorant control, nest exclusion devices, cave gating) Note: Limited eligibility for funding through WSFR grant programs
		Wildlife disease management		Interventions	Assessment and management of wildlife disease situations. Includes control or treatment of diseased animals to maintain populations of species at risk and restore ecological functions (e.g., chronic wasting disease, brucellosis, tuberculosis, plague management activities)
	Data Collection and Analysis				
		Database development and management		Databases	Information technology development and maintenance to support project objectives (e.g., statewide database development) Note: This is different from other Data Collection and Analysis activities in that it refers to the hardware, software, and supporting infrastructure that support multiple data collection efforts
			Database development	Databases	Information technology development to support project objectives (e.g., statewide database development) Note: This is different from other Data Collection and Analysis activities in that it refers to the hardware, software, and supporting infrastructure that support multiple data collection efforts
			Information systems operations and maintenance	Databases	Information technology maintenance to support project objectives (e.g., GIS analyses) Note: This is different from other Data Collection and Analysis activities in that it refers to the hardware, software, and supporting infrastructure that support multiple data collection efforts

Wildlife TRACS Project Action Levels with Indicators 8/20/14

Project Level	Action Level 1	Action Level 2	Action Level 3	Level 2 and Level 3 Output Measures	Description/Examples/Notes
		Research, survey or monitoring - fish and wildlife populations		Projects	Collection and analysis of data as part of research, survey or monitoring primarily focused on fish and wildlife populations Note: includes compilation, management, synthesis, analysis and reporting of spatial and non-spatial data Note: Code work on fish and wildlife diseases to Wildlife Disease Management within Direct Management of Natural Resources
			Abundance determination	Projects	Determination of relative abundance or estimation of size of fish and wildlife populations (e.g., adult population estimate, juvenile relative abundance)
			Age, size and sex structure	Projects	Determination of age, size or sex structure of fish and wildlife populations (e.g., age and growth, length frequency, sex ratio)
			Baseline inventory	Projects	Baseline survey and inventory to understand distribution of fish and wildlife populations
			Food habits	Projects	Studies on food habits of fish and wildlife species or their utilization as prey
			Genetics	Projects	Genetics studies of fish and wildlife populations (e.g., population connectivity, hybridization)
			Movement	Projects	Studies of fish and wildlife movements (e.g., tagging, telemetry)
			Population assessment	Projects	Assessments of biological information to determine status of fish and wildlife populations (e.g., population viability analysis, fisheries stock assessment)
			Reproduction	Projects	Studies of reproduction of fish and wildlife populations (e.g., fecundity, nesting success)

NOTE: The asterix (*) denotes required activity level data

Wildlife TRACS Project Action Levels with Indicators 8/20/14

Project Level	Action Level 1	Action Level 2	Action Level 3	Level 2 and Level 3 Output Measures	Description/Examples/Notes
		Research, survey or monitoring - habitat		Projects	Collection and analysis of data as part of research, survey or monitoring primarily focused on fish and wildlife habitats Note: includes compilation, management, synthesis, analysis and reporting of spatial and non-spatial data
			Baseline inventory	Projects	Baseline survey and inventory to understand distribution of fish and wildlife habitat quality and quantity (e.g., wetland mapping)
			Monitoring	Projects	On-going monitoring of fish and wildlife habitat quality and quantity (e.g., annual early successional habitat survey, artificial reef condition)
		Research, survey or monitoring - utilization		Projects	Collection and analysis of data as part of research, survey or monitoring primarily focused on utilization of fish or wildlife resources and demographics of users Note: includes compilation, management, synthesis, analysis and reporting of data
			Facility usage/inventory	Projects	Collection and analysis of data as part of research, survey or monitoring primarily focused on number and usage of facilities (e.g., survey of boat pumpout usage; inventory of fish screen devices)
			Harvest	Projects	Collection and analysis of data as part of research, survey or monitoring primarily focused on utilization of fish or wildlife resources (e.g., lake creel surveys; deer harvest statistics)
			Human dimensions	Projects	Collection and analysis of data as part of research, survey or monitoring primarily focused on human dimensions (e.g., demographic surveys; resource economics analyses)

NOTE: The asterix (*) denotes required activity level data

Wildlife TRACS Project Action Levels with Indicators 8/20/14

Project Level	Action Level 1	Action Level 2	Action Level 3	Level 2 and Level 3 Output Measures	Description/Examples/Notes
		Techniques development		Studies	Research and development of techniques important for the conservation and management of fish and wildlife
			Artificial propagation studies	Studies	Research on artificial propagation of fish and wildlife (e.g., nutrition studies, culture methods)
			Educational methods research	Studies	Research on educational instruction and evaluation methods
			Habitat restoration methods	Studies	Development or improvement of methods to restore habitats and natural processes (e.g., evaluations of water level fluctuations)
			Fish and wildlife research, survey and management techniques	Studies	Development or improvement of research techniques or management tools (e.g., tag retention studies, sampling device improvements, testing of animal control devices)
	Education				
		Educator/Instructor training		Instructors	Training of educators/instructors on aquatic resources, firearm safety, and archery-related activities
			Aquatic resource education (*)	Instructors	Training of new instructors and teachers in aquatic resource education who will teach others Note: This includes angler education volunteer instructors, teachers, nature center staff and camp counselors who attend ARE workshops, teachers who help the agency write curriculum, etc.
			Hunter education - firearms (*)	Instructors	Training of new and in-service volunteer instructors in hunter education who will teach others Note: Could be funded through Wildlife Restoration basic or Section 10 enhanced hunter education
			Cumulative number of active instructors (*)	Instructors	Number of active hunter education volunteer instructors including those just trained within a given year Note: Could be funded through Wildlife Restoration basic or Section 10 enhanced hunter education

NOTE: The asterix (*) denotes required activity level data

Wildlife TRACS Project Action Levels with Indicators 8/20/14

Project Level	Action Level 1	Action Level 2	Action Level 3	Level 2 and Level 3 Output Measures	Description/Examples/Notes
		Student training		Students	Training of students on aquatic resource education, firearm safety, or archery-related activities Note: Could include Section 10 enhanced hunter education non-range related enhancements to the program (e.g., training supplies acquired, operations and maintenance, etc.)
			Aquatic resource education (*)	Students	Instruction of students on aquatic resources in an educational setting (contact hour of 0.5 or more) Note: This does not include people who have no personal educational interaction - reading an article, borrowing a video, walking by an exhibit booth, etc.; or people that the agency trained to help deliver the program
			Hunter education - firearms (*)	Students	Instruction of students on firearm safety in an educational setting leading to hunter education certification Note: Could be funded through Wildlife Restoration basic or Section 10 enhanced hunter education Note: Could include participation in programs intended to recruit and retain hunters that are only eligible through Section 10 enhanced hunter education
			Hunter education - Archery in the Schools (*)	Students	Instruction of students on archery-related activities specifically through the Archery in the Schools program Note: Can only be funded with Section 10 enhanced hunter education Note: Usage started with TRACS launch at start of FY 2013.
			Hunter education - other archery (*)	Students	Instruction of students on archery hunting-related activities not through the Archery in the Schools program Note: Could be funded through Wildlife Restoration basic or Section 10 enhanced hunter education Note: Pre-TRACS data could have included Archery in the Schools information.

NOTE: The asterix (*) denotes required activity level data

Wildlife TRACS Project Action Levels with Indicators 8/20/14

Project Level	Action Level 1	Action Level 2	Action Level 3	Level 2 and Level 3 Output Measures	Description/Examples/Notes
			Wildlife education	Students	Instruction of students on wildlife species and their habitats in an educational setting Note: This activity has a limited eligibility for reimbursement through WSFR grant programs
	Facilities and Areas (Major Renovation)	Agency support facilities		Sites	Major renovation of facilities used by agency personnel in support of programs/projects (e.g., office buildings, garages, equipment sheds)
		Aquatic resource education centers		Sites	Major renovation of facilities for aquatic resource education
		Boating access facilities		Number	Major renovation of facilities providing access for anglers and others using motor boats
			Launch ramps (*)	Number	Boat ramp lanes at boat launch sites
			Docks/piers (*)	Number	Docks/piers at boat launch sites
			Parking areas (*)	Number	Parking areas at boat launch sites
			Parking spaces (*)	Number	Parking spaces at boat launch sites
			Access roadways (*)	Number	Roadways to access launch ramps
			Restrooms (*)	Number	Restrooms at boat launch sites
			Fish cleaning stations (*)	Number	Fish cleaning stations at boat launch sites
			Shelters (*)	Number	Shelters at boat launch sites
		Boat pump out and dump stations		Number	Major renovation of facilities for pumping sewage from boats Note: Typically funded through the Clean Vessel Act program
			Pump out stations (*)	Number	Pump out stations
			Dump stations (*)	Number	Dump stations
			Floating restrooms (*)	Number	Floating restrooms
			Pump out boats (*)	Number	Pump out boats
		Fish passage facilities		Number	Major renovation of facilities designed to allow fish to move past instream barriers (e.g., fish ladders; counting stations) Note: Not related to removal of dams and other barriers coded elsewhere
			Counting traps/stations	Number	Counting traps/stations
			Downstream bypass facilities	Number	Facilities designed specifically for downstream movement of fish

NOTE: The asterix (*) denotes required activity level data

Wildlife TRACS Project Action Levels with Indicators 8/20/14

Project Level	Action Level 1	Action Level 2	Action Level 3	Level 2 and Level 3 Output Measures	Description/Examples/Notes
			Fish ladders	Number	Fish ladders
			Fish lifts	Number	Fish lifts
			Nature-like fishways	Number	Fishways whose designs are based on simulating natural stream characteristics and are constructed of natural materials
		Fish screening and related facilities		Sites	Major renovation of screening systems that prevent fish from passing into areas that do not support their survival (e.g., into irrigation diversion channels). Note: Primarily funded by FRIMA grant program in Region 1
		Hatcheries (recreational purposes)		Sites	Major renovation of facilities to propagate fish or wildlife species for restoration
		Hatcheries (restoration)		Sites	Major renovation of facilities to propagate fish or wildlife species for recreational purposes
		Hunter education - archery ranges		Sites	Major renovation of archery ranges for hunter education purposes
		Hunter education - classrooms		Sites	Major renovation of classrooms for hunter education purposes Note: Could be funded through Wildlife Restoration basic or enhanced hunter education
		Hunter education - firearm shooting ranges		Sites	Major renovation of firearm shooting ranges for hunter education purposes Note: Could be funded through Wildlife Restoration basic or enhanced hunter education
		Public fishing areas/access		Number	Major renovation of non-boating access public fishing areas Note: Activities primarily for restoration and management of species and habitats should be coded to Create, Restore or Enhance Habitat and Natural Processes
			Carry-down access	Number	Access points for carry-down boats
			Fishing piers	Number	Fishing piers
			Parking areas	Number	Parking areas for fishing
			Jetties	Number	Jetties for fishing
			Access roadways	Number	Roadways to access fishing areas
			Restrooms	Number	Restrooms at fishing areas
			Fish cleaning stations	Number	Fish cleaning stations at fishing areas
			Shelters	Number	Shelters at fishing areas

NOTE: The asterix (*) denotes required activity level data

Wildlife TRACS Project Action Levels with Indicators 8/20/14

Project Level	Action Level 1	Action Level 2	Action Level 3	Level 2 and Level 3 Output Measures	Description/Examples/Notes
		Transient boat tie up - primary facilities		Number	Major renovation of primary facilities for tie-up of transient boats Note: Typically funded through Boating Infrastructure Grant program
			Docks/slips (*)	Number	Spaces for tie-up to docks
			Moorings (*)	Number	Moorings
			Gangways (*)	Number	Gangways
		Transient boat tie up - secondary facilities		Number	Major renovation of secondary facilities for tie-up of transient boats Note: Typically funded through Boating Infrastructure Grant program
			Restrooms (*)	Number	Restrooms
			Fuel stations (*)	Number	Fuel stations
			Laundry facilities (*)	Number	Laundry facilities
		Wildlife Management Areas		Number	Major renovation of facilities at Wildlife Management Areas
			Campgrounds	Number	Campgrounds
			Dikes/levees	Number	Dikes/levees
			Observation structures	Number	Wildlife blinds, towers, platforms, etc.
			Parking lots	Number	Parking lots
			Roads	Number	Roads
	Facilities and Areas (New Construction)	Agency support facilities		Sites	Construction of new facilities used by agency personnel in support of programs/projects (e.g., office buildings, garages, equipment sheds)
		Aquatic resource education centers		Sites	Construction of new facilities for aquatic resource education
		Boat pump out and dump stations		Number	Construction of new facilities for pumping sewage from boats Note: Typically funded through the Clean Vessel Act program
			Dump stations (*)	Number	Dump stations
			Floating restrooms (*)	Number	Floating restrooms
			Pump out boats (*)	Number	Pump out boats
			Pump out stations (*)	Number	Pump out stations

NOTE: The asterix (*) denotes required activity level data

Wildlife TRACS Project Action Levels with Indicators 8/20/14

Project Level	Action Level 1	Action Level 2	Action Level 3	Level 2 and Level 3 Output Measures	Description/Examples/Notes
		Boating access facilities	Access roadways (*)	Number	Roadways to access fishing areas
			Docks/piers (*)	Number	Docks/piers at boat launch sites
			Fish cleaning stations (*)	Number	Fish cleaning stations at boat launch sites
			Launch ramps (*)	Number	Boat ramp lanes at boat launch sites
			Parking areas (*)	Number	Parking areas at boat launch sites
			Parking spaces (*)	Number	Parking spaces at boat launch sites
			Restrooms (*)	Number	Restrooms at boat launch sites
			Shelters (*)	Number	Shelters at boat launch sites
		Fish passage facilities		Number	Construction of new facilities designed to allow fish to move past instream barriers (e.g., fish ladders; counting stations) Note: Not related to removal of dams and other barriers coded elsewhere
			Counting traps/stations	Number	Counting traps/stations
			Downstream bypass facilities	Number	Facilities designed specifically for downstream movement of fish
			Fish ladders	Number	Fish ladders
			Fish lifts	Number	Fish lifts
			Nature-like fishways	Number	Fishways whose designs are based on simulating natural
		Fish screening and related facilities		Sites	Construction of new screening systems that prevent fish from passing into areas that do not support their survival (e.g., into irrigation diversion channels). Note: Primarily funded by FRIMA grant program in Region 1
		Hatcheries (recreational purposes)		Sites	Construction of new facilities to propagate fish or wildlife species for restoration or recreational purposes
		Hunter education - archery ranges		Sites	Construction of new archery ranges for hunter education purposes
		Hunter education - classrooms		Sites	Construction of new classrooms for hunter education purposes Note: Could be funded through Wildlife Restoration basic or Section 10 enhanced hunter education Note: Pre-TRACS data could have included major renovation or operations and maintenance

NOTE: The asterix (*) denotes required activity level data

Wildlife TRACS Project Action Levels with Indicators 8/20/14

Project Level	Action Level 1	Action Level 2	Action Level 3	Level 2 and Level 3 Output Measures	Description/Examples/Notes
		Hunter education - firearm shooting ranges		Sites	Construction of new firearm shooting ranges for hunter education purposes Note: Could be funded through Wildlife Restoration basic or Section 10 enhanced hunter education Note: Pre-TRACS data could have included major renovation
		Public fishing areas/access		Number	Major renovation of non-boating access public fishing areas Note: Activities primarily for restoration and management of species and habitats should be coded to Create, Restore or Enhance Habitat and Natural Processes
			Access roadways	Number	Roadways to access fishing areas
			Carry-down access	Number	Access points for carry-down boats
			Fish cleaning stations	Number	Fish cleaning stations at fishing areas
			Fishing piers	Number	Fishing piers
			Jetties	Number	Jetties for fishing
			Parking areas	Number	Parking areas for fishing
			Restrooms	Number	Restrooms at fishing areas
			Shelters	Number	Shelters at fishing areas
		Transient boat tie up - primary facilities		Number	Major renovation of primary facilities for tie-up of transient boats Note: Typically funded through Boating Infrastructure Grant program
			Docks/slips (*)	Number	Spaces for tie-ups to docks
			Gangways (*)	Number	Gangways
			Moorings (*)	Number	Moorings
		Transient boat tie up - secondary facilities		Number	Major renovation of secondary facilities for tie-up of transient boats Note: Typically funded through Boating Infrastructure Grant program
			Fuel stations (*)	Number	Fuel Stations
			Laundry facilities (*)	Number	Laundry Facilities
			Restrooms (*)	Number	Restrooms

NOTE: The asterix (*) denotes required activity level data

Wildlife TRACS Project Action Levels with Indicators 8/20/14

Project Level	Action Level 1	Action Level 2	Action Level 3	Level 2 and Level 3 Output Measures	Description/Examples/Notes
		Wildlife Management Areas		Number	Major renovation of facilities at Wildlife Management Areas
			Campgrounds	Number	Campgrounds
			Dikes/levees	Number	Dikes/Levees
			Observation structures	Number	Wildlife blinds, towers, platforms, etc.
			Parking lots	Number	Parking Lots
			Roads	Number	Roads
	Facilities and Areas (Operations and Mantenance)	Agency support facilities		Sites	Routine operations and maintenance of facilities used by agency personnel in support of programs/projects (e.g., office buildings, garages, equipment sheds)
		Aquatic resource education centers		Sites	Routine operations and maintenance of facilities for aquatic resource education
		Boat pump out and dump stations		Number	Routine operations and maintenance of facilities for pumping sewage from boats Note: Typically funded through the Clean Vessel Act program
			Dump stations	Number	Dump Stations
			Floating restrooms	Number	Floating Restrooms
			Gallons of sewage pumped	Number	Gallons of sewage pumped. Note: Likely to be a required data element in the future when CVA regulations are revised
			Pump out boats	Number	Pump out boats
			Pump out stations	Number	Pump out stations
		Boating access facilities		Number	Routine operations and maintenance of facilities providing access for anglers and others using motor boats
			Access roadways (*)	Number	Roadways to access launch ramps
			Docks/piers (*)	Number	Docks/piers at boat launch sites
			Fish cleaning stations (*)	Number	Fish cleaning stations at boat launch sites
			Launch ramps (*)	Number	Boat ramp lanes at boat launch sites
			Parking areas (*)	Number	Parking areas at boat launch sites
			Parking spaces (*)	Number	Parking spaces at boat launch sites
			Restrooms (*)	Number	Restrooms at boat launch sites
			Shelters (*)	Number	Shelters at boat launch sites

NOTE: The asterix (*) denotes required activity level data

Wildlife TRACS Project Action Levels with Indicators 8/20/14

Project Level	Action Level 1	Action Level 2	Action Level 3	Level 2 and Level 3 Output Measures	Description/Examples/Notes
		Cooperatively managed areas for hunting		Acres	Lands not owned by the State fish and wildlife agency that are cooperatively managed for hunting purposes (e.g., US Forest Service lands, State parks, private lands)
			Government agency	Acres	Operations and maintenance activities on lands owned by other government agencies
			Private lands	Acres	Operations and maintenance activities on privately owned lands
		Fish passage facilities		Number	Routine operations and maintenance of facilities designed to allow fish to move past instream barriers (e.g., fish ladders; counting stations) Note: Not related to removal of dams and other barriers coded elsewhere
			Counting traps/stations	Number	Counting traps/stations
			Downstream bypass facilities	Number	Facilities designed specifically for downstream movement of fish
			Fish ladders	Number	Fish ladders
			Fish lifts	Number	Fish lifts
			Nature-like fishways	Number	Fishways whose designs are based on simulating natural stream characteristics and are constructed of natural materials
		Fish screening and related facilities		Sites	Routine operations and maintenance of screening systems that prevent fish from passing into areas that do not support their survival (e.g., into irrigation diversion channels). Note: Primarily funded by FRIMA grant program in Region 1
		Hatcheries (recreational purposes)		Sites	Routine operations and maintenance of facilities to propagate fish or wildlife species for recreational purposes
		Hatcheries (restoration)		Sites	Routine operations and maintenance of facilities to propagate fish or wildlife species for restoration purposes
		Hunter education - archery ranges		Sites	Routine operations and maintenance of archery ranges for hunter education purposes

NOTE: The asterix (*) denotes required activity level data

Wildlife TRACS Project Action Levels with Indicators 8/20/14

Project Level	Action Level 1	Action Level 2	Action Level 3	Level 2 and Level 3 Output Measures	Description/Examples/Notes
		Hunter education - classrooms		Sites	Routine operations and maintenance of classrooms for hunter education purposes Note: Could be funded through Wildlife Restoration basic or Section 10 enhanced hunter education
		Hunter education - firearm shooting ranges		Sites	Routine operations and maintenance of firearm shooting ranges for hunter education purposes Note: Could be funded through Wildlife Restoration basic or Section 10 enhanced hunter education
		Public fishing areas/access		Number	Routine operations and maintenance of non-boating access public fishing areas Note: Activities primarily for restoration and management of species and habitats should be coded to Create, Restore or Enhance Habitat and Natural Processes
			Access roadways	Number	Roadways to access fishing areas
			Carry-down access	Number	Access points for carry-down boats
			Fish cleaning stations	Number	Fish cleaning stations at fishing areas
			Fishing piers	Number	Fishing piers
			Jetties	Number	Jetties for fishing
			Parking areas	Number	Parking areas for fishing
			Restrooms	Number	Restrooms at fishing areas
			Shelters	Number	Shelters at fishing areas
		Wildlife Management Areas		Number	Routine operations and maintenance of Wildlife Management Areas Note: Activities primarily for restoration and management of species and habitats should be coded to Create, Restore or Enhance Habitat and Natural Processes
			Boundary designation	Number	
			Campgrounds	Number	Campgrounds
			Dikes/levees	Number	Dikes/Levees
			Observation structures	Number	Wildlife blinds, towers, platforms, etc.
			Parking lots	Number	Parking Lots
			Trails	Number	

NOTE: The asterix (*) denotes required activity level data

Wildlife TRACS Project Action Levels with Indicators 8/20/14

Project Level	Action Level 1	Action Level 2	Action Level 3	Level 2 and Level 3 Output Measures	Description/Examples/Notes
			Trash Collection	Number	
			Roads	Number	Roads
	Land and Water Rights Acquisition and Protection (Potential High Level Purposes: Conservation/ Management, Recreation, Administration)			Acres	
		Land acquisition	Fee title	Acres	Acquisition of lands through fee title acquisition
			Non-fee title	Acres	Acquisition of lands through leases, permanent easements, cooperative agreements, contracts or other non-fee title arrangements
		Water rights acquisition	Fee title	Acres Feet	Purchase of water rights through fee title acquisition (e.g., purchase of water rights to maintain adequate flows for endangered stream fishes)
			Non-fee title	Acres Feet	Acquisition of water rights through leases, permanent easements, cooperative agreements, contracts or other non-fee title arrangements (e.g., purchase of water rights to maintain adequate flows for endangered stream fishes)
		Conservation area designation		Acres	Designation of a site or landscape as having unique and important value to fish and wildlife with or without legal protections (e.g., waterfowl breeding area, Marine Protected Area)
		Private lands agreements		Acres	Number of acres that are protected by agreement with private landowners, but which do not involve active habitat improvement Note: Used extensively within the Landowner Incentive Program
	Law Enforcement (Potential High Level Purposes: Conservation/ Management, Recreation)	Law enforcement		Cases	Enforcement of laws and regulations related to the protection of fish and wildlife

NOTE: The asterix (*) denotes required activity level data

Wildlife TRACS Project Action Levels with Indicators 8/20/14

Project Level	Action Level 1	Action Level 2	Action Level 3	Level 2 and Level 3 Output Measures	Description/Examples/Notes
	Outreach				
		Partner/stakeholder engagement		Number	Engagement of partners to achieve shared objectives and broader coordination across overlapping areas
			Government agency	Number	Engagement of federal, state and local agencies and tribal entities to achieve shared objectives and broader coordination across overlapping areas (e.g., outreach with tribal governments for habitat restoration)
			Non-governmental organization	Number	Engagement of the NGO community to achieve shared objectives and broader coordination across overlapping areas (e.g., coordinate with an NGO on a fish and wildlife GIS analysis)
			Others	Number	Engagement of other partners to achieve shared objectives and broader coordination across overlapping areas (e.g., convene an advisory committee from academia to assist with management planning for a species)
		Recruitment and retention activities		Number	Participation in programs intended to recruit and retain anglers, boater, hunters or wildlife watchers
			For fishing and boating (SFR outreach and communications)	Number	Provision of information on fishing and boating opportunities to current and future anglers and boaters (e.g., creation and dissemination of maps of boat ramps, participation in angler recruitment and retention programs) Note: the cost of these activities counts toward the 15 percent SFR apportionment cap on ARE and outreach and communications
			For hunting and shooting	Number	Participation in programs intended to recruit and retain hunters and shooters. Note: Non-hunting related shooting activities are only eligible for Multi-State Grant Program or Section 10 enhanced hunter education funding
			For wildlife watching	Number	Participation in programs intended to recruit and retain wildlife watchers Note: this activity has limited eligibility for funding through WSFR grant programs

NOTE: The asterix (*) denotes required activity level data

Wildlife TRACS Project Action Levels with Indicators 8/20/14

Project Level	Action Level 1	Action Level 2	Action Level 3	Level 2 and Level 3 Output Measures	Description/Examples/Notes
		WSFR program/ subprogram outreach		Number	Provision of educational information on WSFR grants and grant programs to a variety of audiences through a variety of means (e.g., participating in trade shows to share information WSFR funded work; building kiosks to display WSFR program information at supported areas and facilities)
			Displays, exhibits, kiosks	Number	Activities associated with producing displays, exhibits or kiosks
			Presentations, workshops, seminars, conferences	Number	How many presentations, workshops, seminars and conferences were conducted (not attended). Note: an outdoor writers conference, a speech to a hunting club, and media training for biologists count as a total of 3
			Outreach research	Number	Survey or research projects undertaken
			Brochures, Fliers	Number	The number of distinct brochures and flyers prepared, not the press run
			Public service announcements	Number	The number of original public service announcements prepared
			Stories, interviews, news releases	Number	The number of original stories produced, interviews given to the media and/or news releases prepared for the media
			Trade shows	Number	Participation in trade shows including setting up and maintaining booths
	Planning				
		Land use planning		Plans	Leading or participating in land use planning for rural, urban or agricultural lands (e.g., assist in developing county-wide zoning plans, participate in workgroup regarding low impact development siting)

NOTE: The asterix (*) denotes required activity level data

Wildlife TRACS Project Action Levels with Indicators 8/20/14

Project Level	Action Level 1	Action Level 2	Action Level 3	Level 2 and Level 3 Output Measures	Description/Examples/Notes
		Organizational strategic and CMS planning		Plans	Development of agency strategic and operational plans and fish and wildlife comprehensive management systems Note: Does not include actions to implement plans
			Organizational strategic and operational planning	Plans	Development of agency strategic and operational plans Note: Does not include actions to implement plans
			CMS planning	Plans	Development of fish and wildlife comprehensive management systems Note: Does not include actions to implement comprehensive management systems
		Species and habitat management planning		Plans	Development of management plans for fish and wildlife species and habitats
			Species management planning	Plans	Development of management plans for fish and wildlife species (e.g., interjurisdictional fisheries management planning)
			Listed species recovery planning	Plans	Development of recovery plans for federal or state listed species
			Habitat management planning	Plans	Development of management plans for habitats and natural processes (e.g., management planning for longleaf pine habitat; Habitat Conservation Plan development)
			Habitat Conservation Plan (HCP) Development	Plans	
		State Wildlife Action planning		SWAPs	Conduct activities to develop and revise State Wildlife Action Plans (e.g., convene interagency work groups to revise portions of a SWAP, hold public hearings to help set priorities for SWAP conservation actions)
		WSFR program/ subprogram planning		Plans	Conduct planning activities for a specific WSFR program or subprogram (e.g., CVA planning, hunter education planning)

NOTE: The asterix (*) denotes required activity level data

Wildlife TRACS Project Action Levels with Indicators 8/20/14

Project Level	Action Level 1	Action Level 2	Action Level 3	Level 2 and Level 3 Output Measures	Description/Examples/Notes
	Species Re-introduction and Stocking				
		Native species restoration		Animals	Re-introduction, rehabilitation and relocation of native animals or plants in their historic habitats
			Propagation and stocking	Animals	Re-introduction of propagated native animals or plants to their historic habitats (e.g., restore American shad to rivers within their historic range, head-starting rare turtles)
			Rehabilitation	Animals	Rehabilitation of injured fish and wildlife
			Translocation	Animals	Relocation of native species (including plants) to suitable habitats (e.g., translocate/breed in captivity black-footed ferrets to establish new populations in suitable habitat)
		Production and stocking for recreational purposes		Animals	Production and stocking of animals for recreational purposes
			Forage species	Animals	Production and stocking species that serve as forage for recreational species (e.g., rainbow smelt for salmonid species)
			Put-and-take	Animals	Production and stocking harvestable-size animals that are not expected to reproduce or grow significantly before they are harvested (e.g., catchable trout stocking for recreational purposes)
			Put-grow-and-take	Animals	Production and stocking sublegal-size animals for the purpose of maintaining populations with insufficient natural reproduction for sustainable harvest (e.g., walleye fry stocking for future sport fishing)
	Technical Assistance				
				Reviews	Review of agency and private sector policies, projects and plans (primarily related to development and adverse impacts to natural resources) to help ensure potential impacts to fish and wildlife are avoided, minimized and/or compensated/mitigated (e.g., review of municipal pier development, review of transmission corridor siting)

NOTE: The asterix (*) denotes required activity level data

Wildlife TRACS Project Action Levels with Indicators 8/20/14

Project Level	Action Level 1	Action Level 2	Action Level 3	Level 2 and Level 3 Output Measures	Description/Examples/Notes
		Environmental review	Review of proposed projects	Reviews	Review of proposed development projects to help ensure that impacts to fish and wildlife are minimized and resource benefits are maximized
			Review of proposed policies and plans	Reviews	Review of non-conservation oriented policies and plans to help ensure that impacts to fish and wildlife are minimized and resource benefits are maximized (e.g., review of harbor dredging plan, review of state highway plans)
		Technical assistance		Assists	Provision of professional training and technical assistance to others on fish and wildlife assessment and management
			With individuals and groups involved in resource management decision making	Assists	Provision of professional training and technical assistance on fish and wildlife assessment and management to individuals and groups involved in resource management decision-making (e.g., provide agency-collected data to other governmental officials, train non-governmental organizations on new trapping methods, review of conservation-oriented policies and plans)
			With private landowners	Assists	Provision of technical assistance on fish and wildlife management practices to private landowners Note: Could Include development and delivery of economic incentives to private landowners to influence responsible stewardship of land/water and specific species

Appendix N: Glossary

Glossary

2006 Plan: The first State Wildlife Action Plan prepared by New Jersey.

2008 Revised Plan: The State Wildlife Action Plan for New Jersey with some revisions.

2017 Revised Plan: The first comprehensive revision of the 2006 Plan and 2008 Plan, designed to guide wildlife conservation in New Jersey from 2017 to 2027.

Action: Steps taken to advance conservation of a wildlife species, typically to address a threat.

Action Development Workshops: A series of three workshops conducted in 2015 in which wildlife and habitat experts met to identify the broad suite of actions necessary for wildlife conservation between 2017 and 2027.

Action driver: A term from the TRACS lexicon referring to research and outreach needed to advance wildlife conservation.

Adaptive Management: A process for continuously improving management policies and practices through learning from the outcomes of operational programs. Successful adaptive management requires that six steps be completed: (1) assess a problem by acknowledging that there is uncertainty about what policy or practice is best for a particular issue; (2) design a strategy through the careful selection of a policy or management practice to be employed; (3) implement a policy or practice that is likely to identify knowledge that is lacking; (4) monitor key response indicators; (5) analyze the outcomes in relation to the original objectives to determine the effectiveness of the applied policy or practice; and (6) adjust the policy or practice based on an analysis of the results and incorporate into future decisions.

Biodiversity: The variety of life on Earth and the interactions, cycles, and processes of nature that link it all together. In its broadest definition, biodiversity includes individual species, genetic diversity within species, natural communities in which these species interact, and the ecosystems and landscapes in which species evolve and coexist.

Best Management Practices (BMPs): A collection of management approaches implemented in the course of land management that minimize injury to rare wildlife, and maintain or enhance the value of habitat, for rare wildlife populations.

Biotics database: A comprehensive database with information on rare plants and animals in New Jersey and across their ranges.

Connecting Habitat Across NJ (CHANJ); A partnership of 40 government agencies and nonprofit organizations in New Jersey that collaboratively identifies key areas and actions needed to preserve and restore habitat connectivitiy for terrestrial wildlife in the state.

Conservation Focal Areas (CFAs): Key geographic areas for the conservation of wildlife in New Jersey.

Conservation partners: Government agencies, nonprofit organizations, academic institutions, and members of the public who are working with NJDEP to protect and restore New Jersey's imperiled wildlife.

Critical habitat: Habitat that is essential to the persistence and recovery of rare species populations.

Delphi Technique: A systematic method for reaching consensus among experts in which absolute, quantitative answers are either unknown or unattainable.

DFW: The Division of Fish and Wildlife in the New Jersey Department of Environmental Protection.

Ecological Systems: Recurring groups of biological communities that are found in similar physical environments and are influenced by similar dynamic ecological processes and are based on biogeographic region, landscape scale, dominant cover type, and disturbance regime.

ENSP: The Endangered and Nongame Species Program in the Division of Fish and Wildlife.

Extirpation: Loss of a species from a given area. In this plan, it is typically used in the context of a species disappearing from the state.

Focal SGCN: A subset of New Jersey's SGCN consisting of species that are the highest priority for conservation and for which conservation actions are both feasible and likely to succeed. Key criteria for identifying Focal SGCN included regional concern, and New Jersey's importance for the species' persistence, feasibility of known and tested conservation actions, and the likelihood of success to improve New Jersey's populations.

Habitat Conservation Plan: A plan for mitigating loss of wildlife habitat (particularly for endangered species), that usually includes significantly improving habitat condition in one location to compensate for reduction in habitat value in another.

Important Bird Area: A geographic location identified for its value to nesting and/or migrating birds and which meets criteria defined by National Audubon Society. Criteria include use by species of conservation concern, more than 1% of the state or flyway population of a species, and/or other criteria specific to the state, flyway, or hemisphere.

Indigenous wildlife: Wildlife that are native to a particular area or ecosystem, having originated in that area or whose occurrence is the result of natural processes.

International Union for the Conservation of Nature (IUCN) lexicon: Standardized language, primarily relating to threats and actions, that facilitates regional communication and coordination across state and national borders.

Invasive species: A species that is not native to New Jersey or eastern U.S. ecosystems, and whose introduction causes or is likely to cause economic or environmental harm.

IUCN primary threat category: Ten broad groups of threat types that are composed of finer scale threats.

Job: A segment of a project with specific task(s) to accomplish the larger project goal.

Landscape Project: A mapping effort led by ENSP that maps critical wildlife habitat using species sighting data applied to suitable habitat types. Adopted by the NJDEP in 1993 to define habitats, it is a powerful tool for conservation planning and measuring habitat change over time.

Landscape Regions: Broad areas of New Jersey characterized by similar landforms, soils, vegetation, and hydrological regimes that collectively support distinctive habitat and species mixes. New Jersey has five (Delaware Bay, Piedmont/Inner Coastal Plain,

Pinelands, Skylands, and Marine (which is exclusively aquatic) plus a sixth (Atlantic Coast) characterized by marine features.

Native Species: A species that originated in and occurs naturally in a particular region.

NJDEP: The New Jersey Department of Environmental Protection.

Northeast Lexicon system: A blend of the IUCN lexicon and TRACS lexicon that facilitates communication and collaboration on efforts to conserve species that cross state and boundaries.

Northeast Regional Conservation Synthesis: A methodology developed by Terwilliger Consulting to rank conservation need at a regional level by considering (1) the level of concern for the species across its range in the Northeastern U.S., and (2) a state's responsibility for the species' persistence range wide.

NETWHCS: Northeast Terrestrial Wildlife Habitat Classification System.

Northeast U.S.: The region encompassing these 13 states: Connecticut, Delaware, Maryland, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, West Virginia.

Overabundant species: A population of a species in which the number of individuals is at a point where ecological and/or economic damage is occurring.

Project: A collection of tasks or actions to accomplish goals and objectives. In the context of this Plan, a project refers to the collected actions to identify and address threats to wildlife species or their habitats to restore viable and sustainable populations of rare wildlife.

Recovery plan: A detailed set of conservation actions designed to address specific threats in order to preserve and restore an imperiled wildlife species in New Jersey.

Regional Conservation Opportunity Area (RCOA) Project: The project by the North Atlantic Landscape Conservation Cooperative to identify and map a connected network of resilient and ecologically intact habitats that will support biodiversity under changing conditions. The resulting mapping has been presented under the name "Nature's Network." More information is available via the Project website: http://naturesnetwork.org/.

Restoration: The process of re-establishing the functional aspects of an ecosystem to a semblance of its pre-disturbed state.

Results Chain: Diagrams that show the connections between threats, actions, and conservation outcomes. Results chains are not only useful for thinking through and selecting conservation actions, they are a powerful tool for identifying monitoring strategies.

Subsidized predators: Native wildlife species, such as raccoons, foxes, coyotes, skunks, gulls, and crows, that are able to subsist and thrive on resources provided inadvertently (or deliberately) by humans and human communities.

Species of Greatest Conservation Need (SGCN): Species in need of active support to ensure that they remain part of New Jersey's biological heritage. These at-risk birds, mammals,

reptiles, amphibians, fish, and invertebrates are acknowledged as SGCN due to their low and/or declining populations and/or vulnerability to threats.

Species Profiles Report: The presentation, in Appendix F, of information on each of New Jersey's 107 Focal SGCN, including brief life history facts, status and conservation concerns, important habitats, and range in the state.

State Wildlife Action Plan: A 10-year statewide plan for protecting a state's most imperiled wildlife that focuses on Species of Greatest Conservation Need (SGCN), their habitats, threats, and conservation actions to protect them. State Wildlife Action Plans approved by USFWS are required for states to receive State Wildlife Grants for the conservation of SGCN and their habitats.

State Wildlife Grants program: Annual funding from USFWS for conservation of SGCN in each state.

SWAP executive committee: A group composed primarily of conservation partners that helped DFW guide the development of the 2017 Revised Plan.

Threat: Things that place the long-term persistence of wildlife at risk. In the context of this report, the term threats also includes action drivers. Responding to and addressing threats is the driving consideration for conservation actions.

Tracking and Reporting on Actions for Conservation of Species (TRACS) lexicon: A standardized system managed by USFWS that helps standardize language to facilitate collaboration across state and national borders.

USFWS: The United States Fish and Wildlife Service.

This page intentionally left blank

Attachment I: Northeast Lexicon Report

THE NORTHEAST LEXICON:

TERMINOLOGY CONVENTIONS AND DATA FRAMEWORK

FOR STATE WILDLIFE ACTION PLANS

IN THE NORTHEAST REGION

ABSTRACT

State Wildlife Action Plans have been required for federal funding of conservation actions through the Wildlife Conservation and Restoration Program and the State Wildlife Grants Program since 2005 but there is growing recognition of the value of this comprehensive and strategic approach beyond the funding context. In particular, the potential of these state plans to enhance interstate collaboration for habitat management and biodiversity conservation is evident. To facilitate this collaboration, the states in the northeastern U.S. developed a common lexicon for State Wildlife Action Plans which will make possible a regional database of Species of Greatest Conservation Need (SGCN), threats these species face, habitats they rely on, and conservation actions proposed to support their populations. A thorough review of existing systems and a survey of northeastern states were used to develop this set of common terminology. Here we describe a menu of criteria for screening species to be included on lists of SGCN and a set of basic information to document SGCN in a regional database. Regional habitat classification systems for terrestrial and aquatic systems were adopted for use in State Wildlife Action Plans. Northeast region states have adopted the international standard for classification of threats (IUCN) along with a qualitative assessment of urgency, severity, extent, and reversibility. The US Fish and Wildlife Service Wildlife TRACS classification system for conservation actions was adopted as a naming convention and elements of a detailed description to improve the clarity of conservations actions based on S.M.A.R.T. goals and results chain planning were also recommended. National guidance for assessing project results, along with an agreement to utilize standard protocols for species' population and habitat quality assessment whenever possible, constitute the guidance for Element 5, Monitoring. Elements 6-8, related to plan review and public participation rely on existing guidance, leaving states with considerable flexibility. This Northeast Lexicon will improve inter-state communication, facilitating regional planning processes and helping states compare species, habitats, threats, actions, and monitoring plans to find opportunities for collaboration.

TABLE OF CONTENTS

Abstract 1
Table of Contents 2
Executive Summary 3
Section I: Introduction 6
Methods 8
Survey Results 9
Section II: The Northeast Lexicon – User Guide 13
Section III: The Northeast Lexicon 17
Chapter 1: Element 1, Species of Greatest Conservation Need 17
Chapter 2: Element 2, Habitats 24
Chapter 3: Element 3, Threats 29
Chapter 4: Element 4, Actions 33
Chapter 5: Element 5, Monitoring 42
Chapter 6: Element 6, Plan Review 45
Background and Rationale 46
Chapter 7: Element 7 and 8, Public participation 47
Background and Rationale 48
Section III: Conclusion and Recommendations 49
Section IV: References 52
Section V: Appendices 54
Appendix A: June 2013 Literature Review 54
Appendix B: Survey Questions and Results 69
Appendix C: Examples of Committee Charter and Outreach Strategy 92

This report was coordinated by Karen Terwilliger and prepared by Elizabeth Crisfield, for the Northeast Fish and Wildlife Diversity Technical Committee of the Northeast Association of Fish and Wildlife Agencies and may be cited as:

Crisfield, E and the Northeast Fish and Wildlife Diversity Technical Committee. 2013. The Northeast Lexicon: Terminology Conventions and Data Framework for State Wildlife Action Plans in the Northeast Region. A report submitted to the Northeast Fish and Wildlife Diversity Technical Committee. Terwilliger Consulting, Inc., Locustville, VA.

EXECUTIVE SUMMARY

The Northeast Lexicon provides a customized language and data framework for required elements of State Wildlife Action Plans. The Lexicon was proposed and developed by the Fish and Wildlife Diversity Technical Committee of the Northeast Association of Fish and Wildlife Agencies to facilitate inter-state planning in the Northeast Region. State Wildlife Action Plans have the potential to enable states to learn from each other and to allow the region to determine shared threats and priorities – but the diversity of the content and format of the 2005 plans prevented the region from realizing this vision. The Northeast Lexicon establishes a common language and data framework for State Wildlife Action Plans, without prescribing planning procedures or requirements thereby providing both flexibility and guidance to states for their 2015 plan revisions.

The process to develop this common language included extensive research on existing language and planning systems (Appendix A) and a survey of northeastern states tested receptivity and brought prior experience and knowledge to bear on the Lexicon development (Appendix B). The Association of Fish and Wildlife Agencies' *Best Practices for State Wildlife Action Plans* (hereafter "Best Practices Report") also strongly influenced the choices made in the Northeast Lexicon. A series of meetings, with State Wildlife Action Plan Coordinators and Wildlife Diversity Program managers working together to develop a viable Lexicon that balanced regional consistency and state flexibility, ended with the September 2013 meeting of the Fish and Wildlife Diversity Technical Committee where the Northeast Lexicon was finalized.

The Northeast Lexicon is organized around the congressionally required eight elements for State Wildlife Action Plans (page 6). Hierarchical naming systems are adopted for

1) species (existing scientific nomenclature),
2) landscape-scale habitat types,
3) threats to species or habitats, and
4) actions typically recommended to address these threats.

By using these consistent naming systems, common threats to priority species in specific habitats, along with actions proposed to address them, can be identified across the region.

In addition to these systematic naming systems, data structures provide consistent and complete description of species, habitats, threats, actions, and monitoring plans.

1) For species (Element 1), the Northeast Lexicon documents many of the most important status and trend assessments which demonstrate the conservation need of the species.
2) For habitats (Element 2), the Lexicon provides descriptions of extent and condition, both of which are required in State Wildlife Action Plans.

3) For threats (Element 3), the Northeast Lexicon responds to the Best Practices Report developed for the 2015 revision period by outlining six characteristics (immediacy, spatial extent, reversibility, certainty, severity, and likelihood) which are important for assessing threat risk.
4) Offering improvements to the 2005 plans and addressing the Best Practices Report guidance to develop clearer action items (Element 4), the Northeast Lexicon provides a comprehensive guide for describing actions. Using the minimal descriptions in the Lexicon produces a catalog of proposed actions, while adding the second tier of descriptions can assist in action prioritization. A third tier of descriptions is provided for actions that are ready for implementation.
5) A system for developing monitoring plans (Element 5) to assess project success, and basic elements explaining protocols to monitor species status and trend or habitat quality are also included in the Northeast Lexicon.
6) Highlights of guidance for plan review and revision (Element 6) and public/stakeholder/partner engagement (Elements 7 and 8) are provided for easy reference.

As states work through the 2015 State Wildlife Action Plan revision process, the Northeast Lexicon is being applied, tested, and revised. While it is anticipated that some modifications may emerge, State Wildlife Action Plan coordinators are confident that the scope and structure of the Lexicon provides a solid foundation but also believe in its adaptive capacity to continue to evolve with future knowledge and applications. This report recommends that the Northeast Association of Fish and Wildlife Agencies proceed toward the development a regional database of wildlife action plans, incorporating the data format and structure of the Lexicon and developing a pilot database application. This pilot will allow us to test and demonstrate the function of the Lexicon in a database context. The Fish and Wildlife Diversity Technical Committee anticipates this pilot database could be available for states by September 2014, a year before the State Wildlife Action Plan deadline.

The Northeast Association of Fish and Wildlife Agencies Fish and Wildlife Diversity Technical Committee should continue to work toward development of a regional web-accessible database to house individual state's Wildlife Action Plan content. The completed Lexicon forms the foundation of a regional database that will facilitate the sharing of information between states. Such a database will help states share information on priority species, known threats for these species and needed actions to address these threats – the required elements of State Wildlife Action Plans.*

A web-accessible regional State Wildlife Action Plan database incorporating the key elements of individual State Wildlife Action Plans would benefit the region by providing a systematic and

objective way to understand priority species, habitats, and threats in the region. It would help states coordinate actions and use similar monitoring protocols by facilitating the sharing of information. Finally, it would help non-governmental conservation partners support actions on behalf of wildlife in the northeast region. Because many of these opportunities for collaboration are dynamic and outside conventional funding streams, facilitating searches for specific conservation needs can help make these priority actions reality.

This collaborative effort in the northeast region has been highlighted in the Best Practices Report for State Wildlife Action Plans. It can serve other regions as a template for the development and the implementation of a Lexicon and regional database. It exemplifies 50 years of collaborative conservation planning in the northeast and visionary leadership of the Northeast Fish and Wildlife Diversity Technical Committee, Northeast Association of Fish and Wildlife Agencies and the Directors of the fourteen northeast Fish and Wildlife agencies.

**As of September 4, 2014, the NEFWDTC adopted a database developed for the Delaware State Wildlife Action Plan and based on this report as the template for the regional database. A proposal to the NEAFWA Directors was accepted to fund the adaptation of this state database to a regional database with the expectation that State Wildlife Action Plan data will populate the regional database beginning in the Fall of 2015 after revised plans are submitted, making regional SWAP data searchable on the web.*

This report, the result of Northeast State Wildlife Action Plans: Database Framework for Common Elements (RCN2011-08) was supported by State Wildlife Grant funding awarded through the Northeast Regional Conservation Needs (RCN) Program. The RCN Program joins thirteen northeast states, the District of Columbia, and the U.S. Fish and Wildlife Service in a partnership to address landscape-scale, regional wildlife conservation issues. Progress on these regional issues is achieved through combining resources, leveraging funds, and prioritizing conservation actions identified in the State Wildlife Action Plans. See RCNGrants.org for more information.

SECTION I: INTRODUCTION

In the northeastern U.S., states are numerous and borders often ignore landscape features which delineate habitat types. Here, states have a history of employing collaborative approaches for the protection and management of fish and wildlife. This collaboration has been enhanced through a partnership of the member states of the Northeast Association of Fish & Wildlife Agencies (NEAFWA), in particular its Northeast Fish and Wildlife Diversity Technical Committee, and the U.S. Fish & Wildlife Service's (USFWS) North Atlantic and Appalachian Landscape Conservation Cooperatives (LCCs).

The development of State Wildlife Action Plans in 2005 provided a new opportunity to coordinate conservation actions. While all Wildlife Action Plans had to meet or exceed the eight Congressionally required elements (see inset text box) (Fiscal Year 2001 Commerce, Justice, State, and Related Agencies Appropriations Act 2000) to be accepted by the USFWS, differing approaches taken by states in developing their Action Plans have made it difficult to compile and compare information regionally and nationally (Lerner et al. 2006). Among the Wildlife Action Plans under the jurisdiction of the NEAFWA states, there exists broad commonality in focus and approach as well as substantial differences because states used different organizational structures for their plans, different criteria for defining Species of Greatest Conservation Need (SGCN), different habitat classification systems, and different ways to describe threats and actions. Most are lengthy documents that are difficult to search, making it excessively difficult and time consuming, if not impossible, to compare similar conservation needs across the region or sub-regions.

To address these challenges, in 2012 the Northeast Fish and Wildlife Diversity Technical Committee received matching funds from NEAFWA Directors to develop a framework that would allow states, LCC's, and other partners to compare Wildlife Action Plans across state lines. At the same time, the Association of Fish and Wildlife Agencies prepared guidance entitled *Best Practices for State Wildlife Action Plans* to help states learn from each other and provide resources to improve the effectiveness of these comprehensive plans (Association of Fish and Wildlife Agencies, Teaming With Wildlife Committee, State Wildlife Action Plan (SWAP) Best Practices Working Group 2012) (hereafter "Best Practices Report"). For states that share Species of Greatest Conservation Need and habitat types, these best practices encourage the use of common classification systems. In fact, the Best Practices Report highlighted the proposal for the Northeast Lexicon as Case Study 3c (p. 21), effectively endorsing this as a viable solution to the nationally recognized problem of regional collaboration and integration.

Required Elements for State Wildlife Action Plans

Element 1: "… information on the distribution and abundance of species of wildlife, including low population and declining species as the state fish and wildlife department deems appropriate, that are indicative of the diversity and health of wildlife of the state;"

Element 2. "identifies the extent and condition of wildlife habitats and community types essential to conservation of species identified under *Element 1;*"

Element 3. "identifies the problems which may adversely affect the species identified under *Element 1* or their habitats, and provides for priority research and surveys to identify factors which may assist in restoration and more effective conservation of such species and their habitats;"

Element 4. "determines those actions which should be taken to conserve the species identified under *Element 1* and their habitats and establishes priorities for implementing such conservation actions;"

Element 5. "provides for periodic monitoring of species identified under *Element 1* and their habitats and the effectiveness of the conservation actions determined under *Element 4*, and for adapting conservation actions as appropriate to respond to new information or changing conditions;"

Element 6. "provides for the review the State wildlife conservation strategy and, if appropriate revision at intervals not to exceed ten years;"

Element 7. "provides for coordination to the extent feasible the State fish and wildlife department, during development, implementation, review, and revision of the wildlife conservation strategy, with Federal, State, and local agencies and Indian tribes that manage significant areas of land or water within the state, or administer programs that significantly affect the conservation of species identified under *Element 1* or their habitats."

Element 8. "A State shall provide an opportunity for public participation in the development of the comprehensive plan required under *Element 1*."

(Fiscal Year 2001 Commerce, Justice, State, and Related Agencies Appropriations Act. Public Law 106-553, codified at U.S. Code 16 (2000) 669(c))

The need for consistent systems for conservation planning has long been recognized and important progress has been made. The U.S. Fish and Wildlife Service is implementing a national conservation action reporting system with uniform metadata for all Wildlife and Sport Fish Restoration Program funded projects called Wildlife TRACS (Tracking and Reporting Actions for the Conservation of Species). Independently, the International Union for Conservation of Nature has adopted a system to classify threats, and actions taken to address these threats.

The northeastern states (Connecticut, Delaware, the District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, and West Virginia) worked together to develop the Northeast Lexicon (this report) – terminology, definitions, and classifications systems for use in State Wildlife Action Plans. Terminology has been developed for each of the eight congressionally required elements in State Wildlife Action Plans. The proposed Wildlife Action Plan terminology can: 1) facilitate the development of multi-state, regional proposals, 2) clarify how each state's proposals guide, align with, or contribute to regional priorities, 3) translate the regional context for state planning purposes, and 4) make it more likely that other partners will implement recommended actions.

Thus, the Northeast Lexicon is consistent with recommendations of the Best Practices Report, meets regional planning goals, and functions holistically, recognizing inter-dependencies between elements. The Northeast Lexicon is designed to be selectively implemented by states to meet their diverse needs – balancing state flexibility and regional consistency. It is viewed as a menu of choices, all of which could be supported by a regional database to facilitate data sharing between states. The practicality of application of the Lexicon in Wildlife Action Plan revision and the feasibility of using the information included in the Lexicon for the prioritization or ranking of threats and actions was also considered.

Planning processes used to develop Wildlife Action Plans are not incorporated in the Northeast Lexicon. For example, the Best Practices Report emphasizes the importance of prioritization in conservation planning because it is a strategic approach which is important in light of limited resources and capacity. Methods for prioritization are a very active area of research and states are currently exploring approaches. Therefore, terminology and methods for prioritization are not provided within the Northeast Lexicon, although attempts were made to ensure that the lexicon outlines the kind of information needed for prioritization.

METHODS

Several key meetings of the Northeast Fish and Wildlife Diversity Technical Committee facilitated discussion regarding the scope, purpose, and format of the Northeast Lexicon. The process of developing the Northeast Lexicon began with an exhaustive review of existing approaches for conservation planning and associated terminology and definitions from states in the northeast region. Other State Wildlife Action Plans were reviewed, along with the USFWS Wildlife TRACS and the International Union for Conservation of Nature's systems for describing threats and actions (developed by Foundations of Success). This comprehensive literature search was conducted to identify other common, consistent terminology which could inform this lexicon development. This literature review included assessments of Elements 1-5,

including species and habitat status, prioritization, vulnerability, threat assessment, and action definition and prioritization and were summarized in a comprehensive report (Appendix A).

Surveys of the NE jurisdictions were developed to gauge regional receptivity to a more consistent terminology and a regional database. The March 2013 survey directed toward Lexicon terminology also intended to identify what states were planning to use in their 2015 revision. Fifteen survey responses, representing ten states provided a basis to understand areas of potential agreement and disagreement. The June 2012 survey directed toward database development has 14 responses and showed broad interest in a regional database for State Wildlife Action Plans, with 54% indicating they were "definitely interested" and the balance indicating they were "probably interested". Results of both surveys are summarized below.

These surveys were followed by a series of four meetings and face-to-face deliberations to identify a balance between state flexibility and regional consistency that the group was comfortable implementing in their Wildlife Action Plan revisions. Finally, a draft of the agreed upon Lexicon was reviewed by states and adopted on September 24, 2013.

SURVEY RESULTS

The state survey of Lexicon Terminology (Appendix B) revealed areas of strong agreement, disagreement, and, in some cases, concepts that were poorly understood or had uncertain outcomes in State Wildlife Action Plans. These results are summarized here.

Question 3: There was strong agreement on the use of State (100%) and Federal (93%) Listing status and State Heritage rank (85%) as criteria for including species on lists of Species of Greatest Conservation Need.

Question 4: The majority (83%) of respondents agreed that attempts should be made to qualitatively assess population trends for all SGCN while recognizing that abundance data are lacking for many species.

Question 5: While the most appropriate spatial unit for conservation may be habitat type, 85% of respondents identified State, County, or Town Boundary as the most practical unit for use in Wildlife Action Plans, although 77% of respondents also identified Watersheds and 70% identified Habitat Patches.

Question 6: 77% or more identified the following characteristics as important in describing data sources for species distributions: the data source, scale, resolution, age, quality, type, and sensitivity.

Question 7: Regarding the types of data that could be used to document species distributions, 92% agreed element occurrence was appropriate, and 62-80% agreed that source feature,

presence/absence points, habitat classes, and habitat patches were also acceptable. 31% or less supported the use of habitat suitability models, niche models, habitat compatibility models, and buffers.

Questions 8 and 9: Previous work to develop the Northeast Terrestrial and Aquatic Habitat Classification Systems was accepted by 69% of respondents with none dissenting (Q8), however the further work to develop GIS systems and spatial habitat condition classifications is not broadly understood (Q9).

Question 10: Using Northeast Partners in Amphibian and Reptile Conservation and the Northeast Fish and Wildlife Diversity Technical Committee as examples of approaches for selecting Species of Greatest Conservation Need based on conservation need and responsibility, 69% of respondents were willing to work toward a common practice for selecting species of greatest conservation need.

Questions 11, 12, 13, and 14: More than 92% of responses agreed that immediacy, certainty, extent, and reversibility are characteristics of threats that should be considered when determining "conservation need" in combination (Q11) and 85% agreed this makes sense when considering single threats affecting single species (Q13). Each of these threat characteristics can be considered in terms of the immediacy and certainty of the impact. There was no agreement on whether or not a useful approach using just 2 or 3 simple categories could be developed (Q12). Scale and extent were supported by 85% of the respondents, while immediacy and reversibility were considered key elements in describing threats by more than 92% of respondents (Q14).

Questions 15 and 16: Most responses (85%) indicated support for movement toward actions with measureable goals, and the ability to measure plan effectiveness as a whole (Q15). The terms Goal; Objective, Desired Outcome, and Indicator were seen as useful words in linking resources with actions and outcomes (>92%) but other aspects of the linkage were poorly understood by respondents (Q 16).

Question 17: Regarding adaptive management, there was agreement that the following terms are useful: Performance Indicator (85%), Start (69%), Duration (77%), and Evaluation Cycle (87%). Fewer responses (55%) supported data management capacity.

Question 18: The link between actions and threats is not always easy to explain. Roughly 83% of responses indicated "threat addressed by action", "human factors addressed by action", "environmental factors addressed by action", "biological stresses addressed by action", and "expected direct benefits" were all useful in describing the nature of the action-threat link.

Questions 19 and 20: Improving planning processes by employing systematic descriptions of actions, such as S.M.A.R.T. goals-setting, received strong support with 85% agreeing that the lexicon should propose terminology in support of this kind of planning process. The same level of agreement was reached on the idea of assessing the feasibility and efficacy of conservation actions.

Questions 21 and 22: Many respondents (77%) were willing to work toward a regional scheme to prioritize conservation (Q21) and effectiveness and cost were considered important factors. Funding availability, implementer availability, and start date were listed as potential considerations but opinions on their use in action prioritization were mixed (Q22).

Question 23: In Wildlife Action Plans, actions should be spatially explicit. More than 92% responses indicated that geo-political boundaries (like counties or towns) would be very important in defining action locations, but 62% indicated that watersheds and management planning boundaries would also be useful. Habitat classes and patches were supported as a geospatial descriptor by only 50% of respondents.

Questions 24, 25, and 28: The importance of identifying data gaps and uncertainties was well recognized (92%) (Q24) and 75% or more agreed that “uncertainty of causality”, “uncertainty of effectiveness”, “uncertainty of status” and “information gap” were all relevant in descriptions of uncertainty in State Wildlife Action Plans (Q25). 75% thought it would be useful to categorize the “level” of uncertainty, but fewer understood how they would categorize the “risk of consequence” or the “feasibility of reducing [uncertainty or risk]”.

Question 26: Of the 82% of respondents that agreed that numerous categories might be used to organize research and monitoring actions proposed in Wildlife Action Plans, 70% or more supported the following categories: threat detection, change in threat status, presence/absence surveys for SGCN distribution, relative abundance/density, reproduction/demography, detect habitat change, survey habitat quality, genetics, detect contaminants/pollution/air and water quality.

Question 27: At the time of the survey, the majority of respondents could not assess the usefulness of the Wildlife TRACS system in the Northeast Lexicon (75%).

Questions 29 and 30: Common keyword, metadata, and bibliographic standards were acceptable to 92% of respondents.

The results of the survey related to a regional database to support inter-state collaboration indicate relatively strong agreement on the benefits and are summarized here.

Question1: With 7 respondents “definitely interested” and 6 “probably interested”, there was strong interest in the development of a web-enabled database tool for State Wildlife Action Plans.

Question 2: Respondents identified the ability to search for recommended actions by species or location, and the ability to group species by habitat as the most important services of the database, but also saw the ability to search for actions by habitats or threats as important. The ability to group species or habitat by threat, or perform more complex correlative searches, was identified as a secondary capability.

Question 3: Respondents identified a number of other potential services the database could provide including identifying actions intended to mitigate climate change impacts, serving to assist in scaling the regional data up and down across jurisdictions, and offering user-friendly report formats.

Question 4: Indicating the likelihood that each state would use the regional database for their Wildlife Action Plan revision process, 78% reported they would be “Very likely” or “Somewhat likely” to use the database with the remainder reporting they were “Not sure”.

Question 5: At the time of the survey, most respondents indicated the database would be most useful if available sometime in 2013, with the majority identifying a summer month.

SECTION II: THE NORTHEAST LEXICON – USER GUIDE

The Lexicon is organized according to the required Elements. Each Element is organized by the anticipated sequence of the workflow or by degree of complexity. In either case, it is anticipated that the first components of an element are most likely to be implemented by all states (for example, see Element 4, below).

While the 8 elements are identified as unique requirements, there is considerable interaction between them. The identification of Species of Greatest Conservation Need (Element 1) considers direct threats to the population (Element 3) or threats to the habitats (Element 2) on which the species depends. Actions (Element 4) and Monitoring activities (Element 5) are responses to these identified threats to species and/or habitats. Because of these inter-dependencies and the availability of data required to assess each Element, there are many practical approaches to applying the Lexicon within a State Wildlife Action Plan.

In Elements 3 and 4 (Threats and Actions) some states may find the need for additional classifications to name the relevant threats and proposed actions. In the interest of regional consistency, states should share these new classifications so other states can also use them.

The detailed outline on the next page provides a quick reference for Elements and their components.

States are encouraged to use the bibliographic standard of the Journal of Conservation Biology (http://joomla.wildlife.org/documents/JWMguidelines2011.pdf). To help readers find unpublished sources, website links (URL) to reports should be provided at the end of the reference. Free bibliographic managers are available including Zotero (http://www.zotero.org/), Mendley (http://www.mendeley.com/) and the Council of Science Editors' Citation Wizard (http://21cif.com/tools/citation/cse/citeWizard_cse_1.0.html).

To improve the consistency of citing Wildlife Action Plans, an example citation should be provided in the front matter. For example:

Pennsylvania Game Commission and Pennsylvania Fish and Boat Commission. 2015. Pennsylvania Wildlife Action Plan. Harrisburg, PA. (link to report)

If prepared by a consultant:

Rhode Island Department of Environmental Management. 2015. Rhode Island Wildlife Action Plan. Prepared by Terwilliger Consulting, Inc. and the RI Chapter of the Nature Conservancy. Providence, RI. (link to report)

Element 1 (Species) Northeast Lexicon provides

- a menu of established conservation assessments used by states when selecting their Species of Greatest Conservation Need (page 19)
    - Federal Legal Listing (http://www.fws.gov/endangered/)
    - Regional SGCN
    - State Legal Listing
    - State Natural Heritage Program and NatureServe Rankings
    - Regional or Species Group Conservation Prioritization
    - IUCN Red List (http://www.iucnredlist.org/)
- a list of foundational criteria used to explain the addition or exclusion of species from the Species of Greatest Conservation Need list (page 19)
    - Species Abundance and Trend
    - Threat
    - State Responsibility
    - Habitat Trend
    - Information Deficient
- a set of species characteristics (e.g. scientific name, habitat type) needed for regional database integration (pages 20-21)
    - Scientific Name
    - Common Name
    - Detailed Scientific Name
    - Associated Habitat Type
    - Associated Habitat Features
    - Habitat Preferences
    - Federal Listing
    - State Listing
    - G-rank (http://www.natureserve.org/explorer/servlet/NatureServe?init=Species)
    - S-rank
    - Distribution within the state
    - Threats impacting the species
    - Population Trend
    - Data Confidence
    - Data Age
    - Data Completion
    - Climate Vulnerability Assessment Tool
    - Climate Vulnerability Score

Element 2 (Habitats) Northeast Lexicon provides

- a recommendation to use the Northeastern Terrestrial Wildlife Habitat Classification System (with consistency at the Macrogroup Level) and the Northeast Aquatic Habitat Classification System to classify and name habitat types (pages 24-26) *A ninth formation class was added to the Terrestrial System for Subterranean Habitats.*
- a new marine habitat classification system developed for Maine's SWAP and many states will work consistently
- terminology to consistently describe habitat characteristics (page 27)
    - Habitat extent
    - Habitat condition
    - Threats to Habitat

Element 3 (Threats) Northeast Lexicon provides

- a recommendation to use the IUCN hierarchical threat classification system (Salafsky et al. 2008) and a table that displays the top tier of the system (page 29) along with a crosswalk to Wildlife TRACS threats
- a set of threat characteristics to assess risk or impact (page 30)
    - Severity
    - Reversibility
    - Immediacy
    - Spatial extent
    - Certainty
    - Likelihood

Element 4 (Actions) Northeast Lexicon provides

- a recommendation to use the Wildlife TRACS hierarchical action classification system and a table displaying the system along with a crosswalk to IUCN actions
- a set of action characteristics to provide a complete description of the proposed action, including monitoring and adaptive management plans (page 34-36)
    - Name (For all actions)
    - Title (For all actions)
    - Objective (For all actions)
    - General Strategy (For all actions)
    - Purpose (For all actions and for prioritization of actions)
    - Benefits (For prioritization of actions)
    - Estimated Costs (For prioritization of actions)
    - Performance Metric (For implementation of actions)

- Urgency (For prioritization of actions)
- Duration (For prioritization of actions)
- Longevity of results (For prioritization of actions)
- Likelihood of Implementation (For prioritization of actions)
- Likelihood of Success (For prioritization of actions)
- Constraints/Other factors (For prioritization of actions)
- Implementing Organizations (For implementation of actions)
- Key Stakeholders (For implementation of actions)
- Location (For implementation of actions)
- Detailed Strategy (For implementation of actions)

Element 5 (Monitoring) Northeast Lexicon provides

- a recommendation to use the Association of Fish and Wildlife Agencies recommendations from "Measuring the Effectiveness of State Wildlife Grants" to assess action results (page 41) (http://www.fishwildlife.org/files/Effectiveness-Measures-Report_2011.pdf)
- a recommendation to use standard protocols or well-described protocols for species monitoring (page 41)
- a recommendation to use standard protocols or well-described protocols for habitat quality monitoring (page 42)

Element 6 (Plan Review) Northeast Lexicon provides

- a summary table of guidance provided by the national Best Practices Report explaining the differing requirements for Comprehensive Review, Major Revision, and Minor Revision related to the following (page 44)
  - Date of review
  - Summary of changes
  - Explanation of no change
  - Web access to the plan
  - Public review
  - Documentation of public review
  - Taxa experts

Elements 7 and 8 (Public Engagement) Northeast Lexicon provides

- Definitions for *public, stakeholders,* and *partners* (page 46)
- An explanation of the differences in communication strategies for each group (page 46)

SECTION III: THE NORTHEAST LEXICON

CHAPTER 1: ELEMENT 1, SPECIES OF GREATEST CONSERVATION NEED

Identifying "Species of Greatest Conservation Need" (SGCN) implies the use of a method to select species based on fundamental considerations such as population status and trend or known threats. After identifying potential screening criteria based on the experiences of the NEAFWA states, drawing on Wildlife Action Plans around the U.S., and reviewing approaches used by other conservation organizations, the Northeast Lexicon represents common sources and considerations for selection of SGCN. These criteria are practical and functional and aim to encompass the range of criteria used by northeastern states when determining Species of Greatest Conservation Need.

The choice of criteria and methods for their application will be made by each state. In the interest of transparency and consistency with the Best Practices Report, Wildlife Action Plans should specify the criteria selected and the methods used so that differences between state lists can be understood and explained. If thresholds specific to an established assessment source are selected (e.g., the range of S-ranks and use of uncertain S-ranks for selecting a subset of species from Natural Heritage Program data, or the categories of vulnerability assigned to species on the IUCN Red List) these choices should also be noted in the explanation of methods.

Most states will use established species assessments (Table 1) as a starting point for selecting SGCN because these established species lists provide a ranking of species concern based on some of the fundamental considerations used to select SGCN (Table 2). Species found on the established assessment lists (Table 1) could all be considered for inclusion as state SGCN, but after reviewing the fundamental considerations (Table 2) some species may not be listed as state SGCN. Conversely, some species not found on the established assessment lists (Table 1) may be listed as state SGCN after reviewing the fundamental considerations (Table 2). If states choose not to list Regional SGCN as state SGCN, even though they occur in the state, the Wildlife Action Plan should include a description of the species' current status in the state and any conservation or monitoring activities occurring in the state. Also, some states have elected to include indicator, keystone or representative species as SGCN even if the species is not vulnerable.

Once species are identified as SGCN, information to identify and describe the species, their habitats, their threats, and the quality of available data should be included in Wildlife Action Plans (Table 3). Choices related to taxonomic conventions should be documented. The Association of Fish and Wildlife Agencies recommends the following taxonomic conventions for use in Wildlife Action Plans.

Reptiles and Amphibians: The Society for the Study of Amphibians and Reptiles (SSAR) is the official taxonomy for North American amphibians and reptiles north of Mexico. http://www.ssarherps.org/pages/comm_names/Index.php

Birds: The American Ornithologists' Union *Check-list of North American Birds* is the official source on the taxonomy of birds found in North and Middle America, including adjacent islands. http://www.aou.org/checklist/north/

Mammals: Wilson and Reeder's (2005) *Mammal Species of the World: a taxonomic and geographic reference*. Available as an online database at http://www.vertebrates.si.edu/msw/mswcfapp/msw/index.cfm

Fishes: Page, L.M., H. Espinosa-Perez, L.T. Findley, C.R. Gilbert, R.N. Lea, N.E. Mandrak, R.L. Mayden, and J.S. Nelson. 2013. Common and scientific names of fishes from the United States, Canada, and Mexico, 7th edition. American Fisheries Society, Special Publication 34, Bethesda, Maryland. http://fisheries.org/shop/51034c (for purchase)

Invertebrates: use NatureServe Explorer. http://www.natureserve.org/explorer/

Plants: USDA Natural Resources Conservation Service PLANTS Database. http://plants.usda.gov/java/

Table 1. The Northeast Lexicon recommends considering the species in these established assessments for inclusion as state SGCN:

Federal Legal Listing	species that are federally-listed as threatened or endangered *if* the species occurs within the state; some states may also consider candidate or petitioned species after positive 90-day finding
Regional SGCN	species that are listed as NEAFWA Regional SGCN (2013) *if* the species occurs within the state
State Legal Listing	species that are state-listed with a legal designation that indicates need for conservation (e.g., threatened, endangered)
State Natural Heritage Program and NatureServe Rankings	species with global ranks (G1-G3) and state ranks (S1-S3); some states may also consider historical, extirpated or possibly extirpated species (GX, GH, SX, SH) or species with uncertain ranks
Regional or Species Group Conservation Prioritization	conservation prioritizations are available for some species groups through prominent organizations and planning systems (e.g. Partners in Flight, National Marine Fisheries Service, and Partnership for Amphibian and Reptile Conservation)
IUCN Red List	species that are Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Near Threatened (NT)

Table 2. The Northeast Lexicon recognizes these fundamental considerations for assessing species conservation need:

Species Abundance and Trend	Population status and trends for a species, including extirpation status
Threat	The number, immediacy, extent, and/or reversibility of known threats to species populations
State Responsibility	The relative importance of the state to conservation of the species, compared to other states or countries in the species' range.
Habitat Trend	Changes in the extent or condition of habitat which may be closely related to threats (e.g. climate change, land use change associated with development, or insect pests which can change the composition of a forest)
Information Deficient	Species that lack sufficient documentation to appear in sources listed in Table 1, or to be justified based on abundance, trend, threat, or habitat concerns may be considered SGCN with an interest in research to better understand conservation needs

Table 3: Information about each species that could be included in State Wildlife Action Plans and the regional database.

Data Name	Data Description	Data Format and example
Scientific Name	Naming conventions should follow taxonomic standards recommended by the Best Practices Report (p. 10).	Genus and species i.e. *Glaucomys sabrinus*
Common Name	Naming should follow standards when available (e.g., American Ornithologists' Union checklist for birds).	i.e. Northern Flying Squirrel
Detailed Scientific Name	If used as a conservation target, subspecies or population segment may be provided.	i.e. *Glaucomys sabrinus macrotis*
Associated Habitat Type	Species should be linked to habitat types using the Northeast Terrestrial Wildlife Habitat Classification System or the Northeast Aquatic Habitat Classification System (see Element 2). Multiple habitats may be selected considering core, supporting, breeding, migratory, wintering or other special habitat use.	NETWHCS or NEAHCS (dropdown menus) (see Element 2)
Associated Habitat Features	If the species is associated with particular sites within the habitat classification systems, these site conditions should be identified. (e.g. Boulder fields, springs, seeps, vernal pools, rocky outcrops, caves, manmade structures, cliffs, talus slopes, flat rocks in stream beds)	i.e. Old-growth
Habitat Preferences	This is a narrative field to explain, in more detail, the habitat requirements or preferences of the species.	i.e. Northern flying squirrels prefer old-growth boreal forests that contain a heavy coniferous component, moist soils, and lots of downed woody debris.
Federal Listing	This documents the federal listing of species.	Endangered, Threatened, Candidate, Petitioned with 30-day finding, no status i.e. no status
State Listing	This documents the state listing of species.	State listing classes i.e. Endangered

G-rank	Global ranks can be downloaded from NatureServe for all species in a state.	G1, G2, G3, G4, G5, G1G2, G2G3, G3G4, G1G3, G2G4, G3G5, GU, GX, GH, GNR, GNA
S-rank	The most up-to-date state ranks should be sourced from State Natural Heritage Programs or other in-state source.	S1, S2, S3, S4, S5, S1S2, S2S3, S3S4, S4S5, S1S3, S2S4, S3S5, SU, SX, SH, SNR, SNA
Distribution within the state	Species distributions may be defined in terms of mapped units such as watersheds, habitat classification systems, geopolitical boundaries, models or other useful spatial units.	i.e. Sites are located in the following counties: Wayne, Pike, Monroe, Carbon, Luzerne, Warren and Potter
Threats impacting the species	Threats should be listed and anticipated interactions between these threats should also be noted.	IUCN Threats, as amended i.e. 5.3.4 Biological Resource Use/ Logging and Wood Harvesting / unintentional effects large scale
Population Trend	Quantitative assessments or qualitative assessments such as increasing, decreasing, stable, or unknown (used by the IUCN RedList) may be suitable.	
Data Confidence	Quality of available data, considering completeness, age, and other factors, should be assessed. Excellent – very useful for management decisions, recent, complete, accurate. Poor – data are unreliable for management decisions because it is historical, sparse, and/or has questionable accuracy and cannot be verified.	Excellent, Good, Fair, Poor, Data Deficient
Data Age	This field could recognize data as historical vs current, or it could provide a date range	
Data Completion	consistency of data over time or space.	
Climate Vulnerability Assessment Tool	This field could describe the methods of an original climate vulnerability assessment or simply refer to an existing tool	Name of Tool
Climate Vulnerability Score	This field contains the results of the assessment.	Numeric score or code

Climate Vulnerability Factors	This field contains notes about the factors that most contributed to the species' vulnerability	Name of factor

BACKGROUND AND RATIONALE

State Wildlife Action Plans are required to identify "species in greatest need of conservation". These species should include low, declining, and otherwise vulnerable populations that are indicative of the diversity and health of the state's wildlife. For each of these species, the distribution and abundance should be reported.

This Northeast Lexicon will help northeastern states communicate which factors were used and how they were used to select the state's Species of Greatest Conservation Need. Differences between state lists will be more easily understood, and a regional database will more readily document methodological differences between states if criteria have standard descriptions. This transparency was highly recommended in the national Best Practices Report for Wildlife Action Plans.

The species screening criteria selected for the Northeast Lexicon are very commonly applied in Wildlife Action Plans nationwide (see Appendix A). Specifically:

- **Threatened and Endangered species status** (federal and state) implies that sufficient documentation of species vulnerability has already been provided and warrants inclusion on the state's SGCN list, provided the species relies on habitat within the state. Likewise, species included on the **Regional SGCN** list have already been screened and vetted within the northeast region. Survey results showed nearly unanimous agreement with using federal and state listing as a criteria for state SGCN.
- **State Natural Heritage Programs** provide state-specific data, including abundance and trend, to assess species population stability. The Best Practices Report recommends the NatureServe conservation status assessment methodology (described below), used by State Heritage Programs, as a standardized method for assessing extinction/extirpation risk. Additional assessments of abundance and trend information (required in Element 1) and species-specific assessment tools may also be included in the screening criteria for SGCN through established **independent assessment programs**, such as Partners in Flight.
- **Global rankings** can highlight species vulnerability and/or importance from the broadest possible perspective.
- While **abundance and trend** data may be lacking for some species, this information is typically the foundation for identifying vulnerable species and is required by Element 1.
- **Threat severity** is a factor in predicting vulnerability especially when species do not yet exhibit impacts (e.g. climate change effects) and the Best Practices Report recommends

that immediacy and magnitude of threats be considered in the process of assessing species' conservation needs.

- The Best Practices Report encourages the consideration of the **importance of state habitat** in determining SGCN (pg. 6) and this consideration has been calculated (albeit in different ways) in the northeast region for some time.
- **Trends in habitat extent or condition** can be important indicators of population trends. This information also helps determine which conservation objectives and strategies will benefit multiple species.
- Species that lack information to determine the appropriate level of conservation concern may be included as SGCN so that population surveys and research to understand habitat requirements can lead to a more informed decision about conservation needs. However, research projects for species that are not SGCN may be proposed to determine the degree of conservation concern.

NatureServe's Conservation Status Assessment (Master et al. 2012) is highly recommended in the Best Practices Report. The fundamental considerations provided in the Northeast Lexicon encompass the scope of factors used in the NatureServe Conservation Status Assessment (Table 4).

Table 4. Factors used in the NatureServe Conservation Status Assessment.

Factor Category	Factor	Condition (Rule)
Rarity	Range Extent	Always use, if available
	Area of Occupancy	Always use, if available
	Population	Always use, if available (species only)
	Number of Occurrences	Always use, if available
	Number of Occurrences or Percent Area with Good Viability/Ecological Integrity	Always use, if available
	Environmental Specificity	Only use if both the Number of Occurrences and Area of Occupancy are Unknown or Null
Trends	Long-term Trend	Always use, if available
	Short-term Trend	Always use, if available
Threats	Threats	Always use, if available
	Intrinsic Vulnerability	Only use if Threats is Unknown or Null

CHAPTER 2: ELEMENT 2, HABITATS

The word "habitat" can be interpreted in many ways, even within the Wildlife Action Plan. Commonly, "habitat" either describes the specific needs of a particular species/guild or is a classification of vegetation or other structure underlying habitat type. While it is clearly linked to the Species of Greatest Conservation Need in plan requirements, Wildlife Action Plans are comprehensive planning documents that guide conservation actions statewide, and thus benefit from taking a landscape-scale perspective that can produce multi-species plans. Furthermore, for the vast majority of species, insufficient data on habitat use and requirements prevents detailed species-specific habitat descriptions. To resolve these disparate interpretations of "habitat", the Northeast Lexicon Element 2 primarily views habitat classification from the landscape scale while providing for species-specific habitat description in Element 1.

Habitat Type. The Northeastern Terrestrial Wildlife Habitat Classification System (hereafter Terrestrial Habitat Classification) (Figure 1) was developed in 2008 to provide a coarse but cohesive system to describe the physical and biological characteristics relevant to wildlife conservation (Gawler 2008). The habitat classification consists of two levels – a habitat system (Table 5) and a structural modifier (Table 6). The habitat system corresponds to the ecological system units developed by NatureServe which occur in the Northeast, with additional systems for altered habitats and land-use types. The hierarchical system includes 7 Formation Classes at the top level, 15 Formations in the second tier, 35 Macrogroups in the third tier and 143 habitat types comprise the bottom level (fourth tier) of a hierarchical system (Table 5). Structural modifiers can be added to describe cover (herbaceous, shrub, open water), age classes, disturbance history, or geologic features like karst (Table 6).

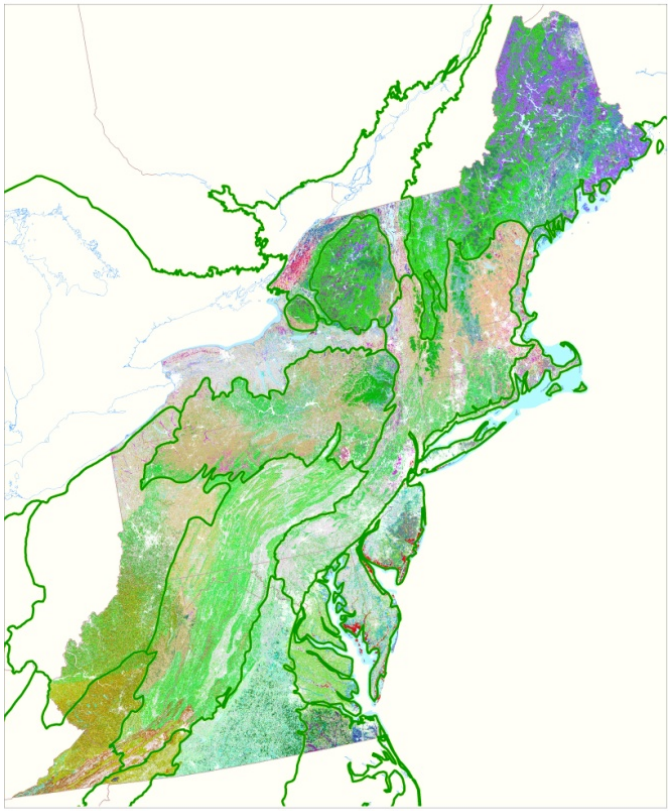


Figure 1. Northeast Terrestrial Wildlife Habitat Classification System.

Table 5. Formations and Macrogroups comprising the Northeast Terrestrial Wildlife Habitat Classification System. Formation 9 (Subterranean) was added for NE SWAPs.

Formation Class	Formation Name	Macrogroup
1. Forest and Woodland	Southeastern Upland Forest	Longleaf Pine
	Northeastern Upland Forest	Southern Oak-Pine Central Oak-Pine Northern Hardwood & Conifer Plantation and Ruderal Forest Exotic Upland Forest
	Northeastern Wetland Forest	Southern Bottomland Forest Coastal Plain Swamp Central Hardwood Swamp Northeastern Floodplain Forest Northern Swamp
	Boreal Upland Forest	Boreal Upland Forest
	Boreal Wetland Forest	Boreal Forested Peatland
2. Shrubland and Grassland	Grassland and Shrubland	Glade and Savanna Outcrop & Summit Scrub Lake & River Shore Ruderal Shrubland & Grassland
	Coastal Scrub-Herb	Coastal Grassland & Shrubland
	Peatland	Northern Peatland Coastal Plain Peatland Central Appalachian Peatland
	Freshwater Marsh	Coastal Plain Pond Emergent Marsh Wet Meadow / Shrub Marsh Modified / Managed Marsh
	Salt Marsh	Salt Marsh
4. Polar and High Montane	Alpine	Alpine
5. Aquatic (in part)	Intertidal	Intertidal Shore
6. Sparsely Vegetated Rock	Cliff & Rock	Cliff and Talus Flatrock Rocky Coast
7. Agricultural	Agricultural	Agricultural
8. Developed	*No name provided*	Maintained Grasses and Mixed Cover
		Urban/Suburban Built
		Extractive
9. Subterranean	Caves and karst	
	Mines, tunnels, and other developed	

Table 6. Structural modifiers to provide additional detail about the habitat condition. Quantitative classes are provided for each modifier type (see NETWHCS documentation).

Gross Cover Type	Modifier Type
Forest (>10% tree cover of >5m)	Canopy cover Evergreen:deciduous ratio (% evergreen) Number of canopy layers Recently burned (detectable) Stand development Understory shrub/herb layer
Shrubland and mixed shrub/herb (not forest, and >10% shrub cover)	% shrub cover Shrub height Evergreen:deciduous (as % evergreen)
Herbaceous (nor forest or shrubland, and >10% herb cover	Cover Grass/forb height Native/introduced Scattered tall shrubs/small trees
Special modifiers for wetlands	Saltmarsh elevation Open water
Special modifiers - other	Karst

States are encouraged to use the macrogroup level (Table 5) without modification for regional consistency. However, habitat systems may be customized within each state to match classification systems used in 2005 or to better describe the habitats of greatest conservation need. In instances for which more specific habitat requirements are known for a given species, the structural modifier may be used.

The Northeast Aquatic Habitat Classification System (hereafter Aquatic Habitat Classification) is a standardized classification system and GIS dataset to describe and map stream systems across the Northeast (Olivero and Anderson 2008). The system and data consistently represents the natural flowing-water aquatic habitat types across this region in a manner that is useful for conservation planning. The system was designed to unify state classifications and promote an understanding of aquatic biodiversity patterns across the entire region. It is not intended to override local stream classifications but rather to put them into a broader context. This approach can be implemented across regional scales using GIS modeled variables that shape aquatic habitats such as stream size, slope, elevation, climate, and geology and lake size, elevation, shoreline sinuosity, and connectivity. This dataset can be used similarly to the Terrestrial Habitat Classification. The Aquatic Habitat Classification is being revised to better represent lakes and ponds, so Wildlife Action Plans should refer to updated documentation.

States worked together to develop a classification system for marine habitats in Fall 2014. Although not formally adopted, states generally agree that Maine's system is comprehensive and sufficiently detailed to represent the important marine habitats for SWAPs. Like the terrestrial and aquatic systems, the marine system is hierarchical:

Formation	**Macrogroup**
Intertidal	Mudflat
	Sandy Shore
	Molusc Reefs
	Bedrock
	Gravel Shore
	Tidal Marsh (peat-forming)
	Water Column
Subtidal	Mud Bottom
	Sand Bottom
	Molusc Reefs
	Bedrock Bottom
	Coarse Gravel Bottom
	Pelagic (Water Column)

Habitat Extent. Both the terrestrial and aquatic systems are available with GIS coverage for the entire region. A map of the habitat type being described could be included in Wildlife Action Plans along with the acreage and the percent of the state classified in the habitat type. For the purposes of describing state habitat, extents of habitat types occurring within the state should be provided. For individual species, habitat extent (habitat used) may be less than the full extent of the habitat type. When this information is available, states may choose to describe habitat extent for a species' population, rather than the entire habitat type, but it should be made clear which extent is quantified.

Habitat Condition. Condition may be described as a result of the Geospatial Condition Analysis of Northeast Habitats currently being prepared as RCN Project 2009-02. The project evaluates the current condition of terrestrial and aquatic habitats across the northeast focusing on indicators of human modification, securement, land impacts (such as hydraulic fracturing), and connectivity since these directly reflect the quality or degradation of habitat. Other potentially useful sources of condition assessment include the UMASS Index of ecological integrity and the NALCC "condition ranks". States may wish to downscale the regional dataset using more specific data available for their state.

Threats to Habitat. All threats that have impacts on the habitat type can be selected from the classification system provided for Element 3.

BACKGROUND AND RATIONALE

State Wildlife Action Plans must describe the extent and condition of habitats and community types that are essential to the conservation of "Species of Greatest Conservation Need". The Best Practices Report recommends a regional approach and specifically mentions the Northeast Habitat Classification System (Terrestrial Wildlife and Aquatic) as examples.

While the northeastern states used different vegetation classification systems in their initial Wildlife Action Plans, the Northeastern Terrestrial Wildlife Habitat Classification System (which is based on ecological systems developed by NatureServe) and Northeastern Aquatic Habitat Classification System were developed under funding from the northeast states, as they determined this was an essential tool for use in multi-state species recovery efforts. Crosswalks between habitat systems used by northeastern states in previous Wildlife Action Plans are provided in Appendix D of The Northeast Terrestrial Wildlife Habitat Classification System Report (Gawler 2008).

Additional work by Mark Anderson (The Nature Conservancy) provides the most applicable and feasible method to describe and quantify habitat condition, consistent with the choice to use the habitat classification systems developed for the region. However, states will rely on higher resolution or ground-truthed habitat condition information when it is available.

In addition, this lexicon suggests that threats specific to habitat types also be identified to facilitate project prioritization, funding, and reporting.

CHAPTER 3: ELEMENT 3, THREATS

Threats come from many different sources, and impacts can be observed at different spatial, temporal, and biological scales. As a result, the risk of the impacts is wide-ranging, as are actions taken in response. The Northeast Lexicon provides a hierarchical system for classifying and naming threats, based on the IUCN classification system (Salafsky et al. 2008) and threat characteristics that are important in determining threat risk and appropriate responses.

Threat Classification System: The Northeast Lexicon adopts the IUCN threat classification system to classify and name threats. This system is hierarchical, with three tiers and is used in the NatureServe rank calculator (see Element 1). The top tier indicates the broadest categorization of threats and includes:

1. Residential and Commercial Development
2. Agriculture and Aquaculture
3. Energy Production and Mining
4. Transportation and Service Corridors
5. Biological Resource Use
6. Human Intrusions and Disturbance
7. Natural System Modifications
8. Invasive and Other Problematic Species and Genes
9. Pollution
10. Geological Events
11. Climate Change and Severe Weather.

Within this structure, regionally agreed upon or state-specific threats may be added when necessary. For example, in recognition of the need to identify administrative motivations for conservation actions, the TRACS action drivers were added to this list (a more detailed list of action drivers can be found in Table 9):

12. Resource Management Needs
13. Recreation Needs
14. Education / Outreach Needs
15. Administrative Needs

An excel spreadsheet providing a crosswalk between IUCN and TRACS threat classification systems is provided as a reference at: http://rcngrants.org/content/northeast-regional-conservation-synthesis-state-wildlife-action-plan-revisions-0

Threat risk. To rank threats by risk (level of impact considering severity and likelihood), the Northeast Lexicon provides definitions for the severity, reversibility, immediacy, spatial extent,

certainty, and likelihood of threats (Table 7). These definitions may apply to single threats, or the compounding impact of interacting threats.

Table 7. Threat characteristics and categorical ratings.

Threat Characteristic	***Low Impact***	***Moderate Impact***	***High Impact***
Severity	**Slight Severity:** Degree of ecological change is minor	**Moderate Severity:** Degree of ecological change is substantial	**Severe:** Degree of ecological change is major
Reversibility (Consider the likelihood of reversing the impacts within 10 years)	**Reversible:** Effects of the threat can be reversed by proven actions	**Reversible with difficulty:** Effects of the threat may be reversed but costs or logistics make action impractical	**Irreversible:** Effects of the threat are irreversible
Immediacy (This characteristic assesses the time scale over which impacts of the threat will be observable.)	**Long-term:** Effects of the threat are expected in 10-100 years given known ecosystem interactions or compounding threats	**Near-term:** Effects of the threat are expected within the next 1 - 10 years	**Immediate:** Effects of the threat are immediately observable (current or existing)
Spatial Extent (Consider impact of threat within 10 years)	**Localized**: (<10%) A small portion of the habitat or population is negatively impacted by the threat.	**Dispersed or Patchy:** (10-50%)	**Pervasive:** (>50%) A large portion of the habitat or population is negatively impacted by the threat.
Certainty	**Low Certainty:** threat is poorly understood, data are insufficient, or the response to threat is poorly understood	**Moderate Certainty:** some information describing the threat and ecological responses to it is available, but many questions remain	**High Certainty:** Sufficient information about the threat and ecological responses to it is available
Likelihood (Consider impact of the threat within 10 years) (This characteristic is used to assess the certainty surrounding the threat and its impacts.)	**Unlikely:** Effects of the threat are unlikely to occur (less than 30% chance)	**Likely:** Effects of threat are likely to occur (30-99% chance)	**Occurring:** Effects of the threat are already observable (100% chance)

BACKGROUND AND RATIONALE

State Wildlife Action Plans must include descriptions of problems adversely affecting Species of Greatest Conservation Need or their habitats. The Best Practices Report for State Wildlife Action Plans recommends the use of the IUCN threat classification system (Salafsky et al. 2008). Threats are viewed as important factors in prioritization of actions and ranking of conservation need.

After considering the applicability of the Wildlife TRACS and IUCN threat classification systems and the scope of threats addressed by conservation actions proposed in Wildlife Action Plans for northeastern states, the IUCN classification system appears most useful at this time, due in part to the more limited number of threats addressed in Wildlife TRACS. The IUCN system is also the recommended choice in the Best Practices Report. However, because actions will often be reported through the Wildlife TRACS system, a translation from IUCN to Wildlife TRACS is provided to facilitate data management.

In addition to naming threats, understanding threat characteristics can help highlight opportunities for species and habitat management or protection. Proposals to fund conservation actions typically explain the threat being addressed in the project justification, and reporting systems, such as Wildlife TRACS, integrate threat identification. To best meet these planning, funding, and reporting needs, utilizing this lexicon will help ensure that all needed information is available in the Wildlife Action Plan. It may also minimize workload as each proposed action is considered for funding or final results are reported and presented. In addition, it may be possible to prioritize threats (and/or associated actions) for regional coordination if multiple states have identified them as pervasive, severe, and/or immediate.

The extensive review of existing conservation planning approaches (see Appendix A) along with needs presented by northeastern states led to the threat characteristics described above. The first four characteristics were widely used by the organizations surveyed. Many of the reviewed approaches used four levels of impact. The three-level approach described here provides a more rapid assessment yet still distinguishes threats. Some approaches characterize past, present, and future threats. Current and future threats are represented here by the "immediacy" characteristic, but past threats are not included.

Immediacy – Other approaches have used the terms urgency or timing. The choice presented above is very similar to Master et al. (2012) and Salafsky et al. (2003).

Spatial extent – Several alternatives were found in the literature, especially "scope". The Northeast Lexicon uses the term "spatial extent" because it is more specific, and many of the other words used by conservation organizations are employed in the impact descriptions for spatial extent, such as "localized", "patchy", "pervasive", and the reference to a "portion" of

habitat. The possibility of interpreting "spatial extent" in the context of populations distributed across the state was added. NALCC and the Geospatial Habitat Condition Analysis provide additional information from models and predictions of spatial extent (NALCC 2013 and Anderson 2013- both ongoing)

Reversibility – The impact levels for this characteristic are adapted from Salafsky et al. (2003).

Certainty – Uncertainty is a long-standing and challenging issue for natural resource managers. In the IUCN guidance for assessors (related to assigning CR/EN/VU ratings), uncertainty is seen as being derived from three sources: natural variability, vagueness in the terms and definitions used in the criteria, and measurement error (Akçakaya et al. 2000, IUCN Standards and Petitions Subcommittee 2013). Lack of data is not considered a part of uncertainty in the IUCN approach. In the discussion of how to deal with uncertainty, IUCN recognizes that risk tolerance and dispute tolerance are factors in decision-making with uncertain information. IUCN recommends a "precautionary but realistic attitude". For the purposes of the Lexicon, lack of data has been included as a source of uncertainty.

Severity – Other approaches have variously used the terms "severity", "intensity", and "impact". The lexicon reserves the word "severity" for the overall assessment based on all of the threat characteristics and uses "intensity" to represent the degree of impact associated with the threat. "Impact" was used for all characteristics to represent the scale of influence the threat would have on resources.

Likelihood – Sometimes referred to as probability as in (Salafsky et al. 2003).

Other options were considered but not included in the lexicon. "Duration" has not been included because few threats will have short durations making this characteristic less useful for distinguishing threat severity, however, it will probably be considered in the assessment of "intensity" since longer "duration" threats will have greater "intensity" impacts. "Persistence" was not included for similar reasons. "Contribution", referring to sources, is addressed outside the severity assessment table. "Impact", as used to describe species or habitat threats, is incorporated in lexicons for Elements 1 and 2.

CHAPTER 4: ELEMENT 4, ACTIONS

Conservation actions often involve physical management of natural resources, but many other types of actions have been proposed in support of wildlife conservation such as property easements to influence land management, recreational use guidelines, education or outreach, and species reintroduction. In some cases, a lack of knowledge about species' requirements inhibits the planning of these more tangible actions, and research or survey actions are required to fill these knowledge gaps.

A complete description of a proposed action would include who is responsible for the action, what will be done, with what benefits, when and where it will be done, how the desired results will be achieved, how progress will be measured, and why the action is being taken. However, because Wildlife Action Plans are planning documents encompassing the wide range of actions listed above, action descriptions must be adaptable. All actions can be classified and named using one naming convention system but not all actions can be fully detailed using all the descriptive prompts provided for in the Lexicon.

Action Classification System: The Northeast Lexicon adopts the Wildlife TRACS action classification system with a small number of amended categories. The system is sufficiently broad in scope with an appropriate level of detail. It is hierarchical, with three tiers. The top tier (listed below) indicates the broadest level of actions. Official TRACS resources (found at https://tracs.fws.gov/wiki/ in the Classroom Handouts Space) should be used as a reference.

- Coordination and Administration
- Direct Management of Natural Resources
- Data Collection and Analysis
- Education
- Facilities and Areas
- Land and Water Rights Acquisition and Protection
- Law Enforcement
- Outreach
- Planning
- Species Reintroduction and Stocking
- Technical Assistance
- Law and Policy (not in Wildlife TRACS)
- Species Management (such as Harvest Management and Trade Management) (not in Wildlife TRACS)
- Partnerships (not in Wildlife TRACS)

An excel spreadsheet providing a crosswalk between TRACS and IUCN action classification systems is provided as a reference at: http://rcngrants.org/content/northeast-regional-conservation-synthesis-state-wildlife-action-plan-revisions-0

Action Description: To address the challenge of systematically describing actions, the Northeast Lexicon provides a set of descriptors that can be used as a template for comprehensive action description (Table 8). The Northeast Lexicon recommends that states strive to provide, for all actions, a name, objective, general strategy, and purpose. This level of description is likely to be appropriate for all actions regardless of the readiness for implementation. The additional descriptors can be selected, as appropriate, to describe actions in a Wildlife Action Plan providing a guide for information that would need to be prepared before implementation of the action. For action prioritization, the purpose (identifying target species or habitats and threats), benefits, costs, urgency, longevity of results, and likelihood of success are common factors that are helpful for deriving maximum conservation benefit given limited funding.

Table 8. Action descriptors.

Lexicon Terminology	**Content**	**Explanation**
Name	The Action name is selected from Wildlife TRACS classification system (amended)	The lexicon described here uses the Wildlife TRACS classification system with hierarchical codes developed. This system includes amendments to incorporate a few actions from the IUCN system (above). Every action should be classified according to the amended Wildlife TRACS system at as detailed a level as possible.
Title	Short descriptive name unique to action	Unique action/species or action/habitat combination
Objective	A concise statement of the objective of the action	An objective is “a specific, measurable, achievable, relevant, and time-limited statement that describes the desired short, medium, or long-term outcomes of a conservation action.”
General Strategy	A concise description of the nature of the strategy for achieving the objective	The strategy to address the objective should be described generally. (More detailed explanation can be provided in the answer to the question “How?”)
Purpose	Identify Species or Habitats directly benefiting from the action, or threats being reduced by the action	Linking an action to a threat (Element 3) or action driver (Table 9) and to the resource that will benefit such as target species (Element 1) or habitats (Element 2) provides a clear explanation of the motivation for the action and begins to reveal the results chain linking the

		strategy to the threat and the expected ecosystem response to mitigating the threat.
Benefits	Depending on the action, benefits (direct or indirect) may be habitat improvements, species' responses, reductions in threat risk, or public or stakeholder benefits.	These answers will likely be suggested by defining what the action is and why it is being taken. However, efforts to prioritize actions will probably require specific benefits to be considered. Answering this question clearly may also help define the measures of project success. It may be helpful to explain the direct benefits and contrast them with the indirect benefits.
Estimated Costs	This should include total future costs in current dollar values, but not include any past expenses for infrastructure that will be used by proposed action. Categories: • Unknown • < $10,000 • $10,000 - $49,999 • $50,000 - $99,999 • $100,000 - $499,999 • $500,000 - $999,999 • > $1,000,000	If action descriptions are intended to be used for action prioritization, cost estimates, even very rough ones, may be helpful. This should include total future costs in current dollar values, but not include any past expenses for infrastructure that will be used by proposed action. Estimates are available from business plans, Joint Ventures, and Partners in Flight. For prioritization purposes, states may choose to calculate cost/acre treated or cost/species to compensate for the fact that multi-species projects may be more expensive than single species projects. A very detailed process for action prioritization is described and evaluated in "Optimal Allocation of Resources among Threatened Species: a Project Prioritization Protocol" (Joseph et al. 2009). States may add subcategories as needed, but should avoid using the unknown category if possible.
Performance Metric	From TRACS or other more specific sources	The performance metric is how success is measured and defined.
Urgency	The urgency of the action should estimate the ideal timeframe for completing the action. Categories: • Initiate immediately (2016) • Initiate within 5 years (2017-2020) • Initiate within 5-10 years (2020-2025) • Can wait 10 years to initiate (2025)	This is a relative estimate of the urgency of the action given the severity of the threats and the priority of the species or habitat

Duration	How long will action take to complete (or need to persist)? • <1 year • 1-2 years • 2-5 years • 5-10 years • >10 years	
Longevity of results	What is the longevity of the results? • <3 years • 3-10 years • 10-20 years • 20-50 years • >50 years	How long will the benefits continue after the action is completed?
Likelihood of Implementation	Can the action be implemented: Categories • Unlikely/Unknown (<30%) • Likely (30-90%) • Certain/Very Likely (90-100%)	
Likelihood of Success	To what degree will the action address the threat or improve species' populations or habitats? Categories • Unlikely/Unknown <30% (not tested/implemented anywhere) • Likely 30-90% (e.g., BMP or sufficient information available) • Certain/Very Likely 90-100% (demonstrated by other projects)	
Constraints/Other factors (narrative)	Describe constraints?	For example: Regulations or Administrative, Environmental (risks to other habitats/SGCN), or Resource (financial or personnel)
Implementing Organization	TRACS needs "Lead Organization" and "Partners". (Organizations or individuals responsible for implementing the action or partners who	If possible, an individual or agency responsible for managing the action could be identified. Partners that should be consulted or engaged could also be identified.

	can assist.) Categories at Regional Level: e.g. federal, state, non-profit, university, commercial/consulting	
Key Stakeholders	Identify stakeholders	Identify any parties that might be affected by the action and prepare for education, outreach or public relations that could assist in a successful implementation of the project
Location	Most states will use counties or watersheds which is consistent with TRACS. However, some states are using TNC ecoregions or physiographic provinces.	Although County and Watershed are the most common spatial units being used by states for SWAPs and are the units endorsed by TRACS, some actions will require more specific location information and others may be more appropriately tied to ecoregions or physiography. Aside from the habitat type, descriptions of where actions take place may include specific locations around the state, specific sites within a smaller locale, or any other geographical designation appropriate to the action. If the action requires monitoring, this description may complement the use of a standard protocol by defining the sampling strategy in a spatial context.
Detailed Strategy	A detailed description of the action, how it will result in the desired effects, how project success will be measured and assessed, and plans for adaptive management	Actions that are ready for implementation may have very developed ideas for accomplishing the objective of the action. Compared to the strategy described above, this is a much more detailed explanation of how the action will be implemented. In cases where actions are not so well developed, this element may include a couple alternatives for implementation. The hypothesis explaining how the proposed action will impact the target by mitigating the threat would ideally be presented in the form of a results chain (See Background and Rationale, below) or theory of change. Wildlife Action Plans are called upon to identify how action results will be monitored so indicators of the impact on the target should be identified along with adaptive management strategies which might be used to improve the results of the action. Monitoring protocols may be identified by reference to standard protocols or development of specific monitoring plans. (Both of these address Element 5).

Table 9. A subset of TRACS action drivers complements the IUCN threat list to provide a complete set. "Resource Threats" are included in the TRACS action drivers but are redundant with IUCN threats and not specific enough and have been omitted from the following list. Official TRACS resources (found at https://tracs.fws.gov/wiki/ in the Classroom Handouts Space) should be used as a reference, this table is provided only as an example.

Level 1	Level 2	Level 3
Resource Management Needs	Resource information collection needs	Lack of initial baseline inventory
		Lack of up-to-date existing information
		Need to answer research question
		Need to develop new technique
	Management decision needs	Need to provide technical assistance
		Need to conduct environmental reviews
		Lack of fish, wildlife and/or habitat planning
Recreation Needs	Training needs	Need for more and/or improved training in outdoor recreation methods
		Need to improve safety/ethics in outdoor recreation
	Public access needs	Need for more public access to areas or facilities for outdoor recreation
		Lack of maintenance/improvements on areas or facilities for outdoor recreation
	Utilization needs	Lack of information on how fish and wildlife resources are utilized
		Lack of information on how outdoor recreation areas and facilities are utilized
		Lack of information on locations of fish and wildlife resources and public access areas and facilities
		Need to maintain or increase recruitment and/or retention of outdoor recreationalists
		Need to maintain or increase supply of fish to support fishing.
Education / Outreach Needs	Education Needs	Need for improved knowledge of fish and wildlife and their habitats
		Need to provide aquatic resources and wildlife education facilities
		Need for improved knowledge of WSFR grant programs and their accomplishments
	Outreach Needs	Need to develop and/or maintain a broad base of support for agency goals and objectives
		Need to maintain and/or increase constituent base
Administrative Needs	Infrastructure Needs	Need to maintain or improve fish and wildlife agency administrative facilities
		Need to maintain or improve information management systems
		Need for agency organizational planning to meet goals and objectives

	Organizational / program planning needs	Need for WSFR program/subprogram planning to meet goals and objectives
	Coordination / administration needs	Need for agency administrative support for effective operations
		Need for coordination for effective program/project management

BACKGROUND AND RATIONALE

State Wildlife Action Plans must describe actions proposed to conserve identified species and habitats and priorities for implementing such actions are needed to develop a plan for wildlife conservation.

In addition to this Wildlife Action Plan requirement, the Best Practices Report recommends the use of the IUCN Hierarchical Action Classification System (Salafsky et al. 2008). Actions are described as "abating known threats" and involving "metrics to measure effectiveness". An important recommended best practice involves the prioritization of actions using decision theory approaches that consider resource vulnerabilities but also cost, feasibility, and likelihood of success (e.g. pg 5, 14-15).

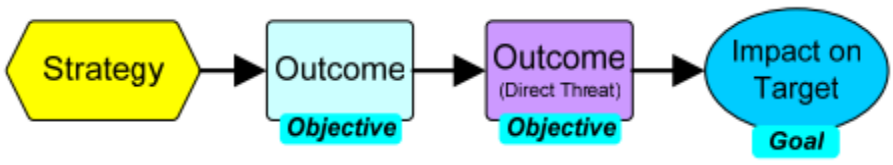
Given the benefit of using action terminology that is largely compatible with the Wildlife TRACS system, and the desire to clearly justify each action, the Northeast Lexicon connects actions with threats and/or action drivers and species or habitats to show exactly how the action contributes to state wildlife conservation.

The Best Practices Report identifies "a need for more specificity with regard to on-the-ground actions". During the Development of this Northeast Lexicon, S.M.A.R.T implementation goals (Doran, 1981) were discussed as a way to improve the clarity of action descriptions in response to the Best Practices Report's recommendation. S.M.A.R.T. goals are Specific, Measurable, Attainable, Relevant, and Time-bound. Because Wildlife Action Plans are planning documents and some proposed actions will not be ready for implementation, it may be difficult to describe these aspects of an action – but being able to answer these questions improves the likelihood of implementation and project success.

The action descriptors listed here were developed based on S.M.A.R.T. planning and are well-aligned with the action development process outlined in the Conservation Measures Partnership's Open Standards for the Practice of Conservation (CMP 2013). Steps 1 and 2 (see figure below) are the basis of the action development process provided in the "Suggestion for Use". Steps 3, 4, and 5 call on information provided in the Northeast Lexicon for Elements 4 and 5.

While the Northeast Lexicon does not specifically recommend any existing prioritization method, advice from the best practices helped ensure that the Lexicon incorporated information typically used in action prioritization. The Lexicon also generally provides the information required for the prioritization method presented and evaluated in "Optimal Allocation of Resources among Threatened Species: a Project Prioritization Protocol" (Joseph et al. 2009)

Using a results chain can provide explicit documentation of the linkages between the action, threat, threat mitigation, targets and indicators (Foundations of Success 2007):



The Strategy explains, generally, how the "Objective" of the action will be achieved. The first outcome identifies the threat or action driver that is motivating the action. The second

outcome identifies the change in the threat, or the mitigation of the threat, that is expected to result in the positive impact on the target or the goal. See *Using Results Chains to Improve Strategy Effectiveness: An FOS How-To Guide* to learn more about creating results chains.

CHAPTER 5: ELEMENT 5, MONITORING

To increase the capacity of the region to share data and to minimize the replication of work developing monitoring plans, monitoring plans would be detailed consistently and shared within the region as much as possible. The three distinct purposes for monitoring (assessing project results, measuring population status and trends, and describing habitat quality) called for in Elements 1, 2, and 4 suggest unique formats. Status assessments of species or habitats are referred to as 'surveys', 'research' includes monitoring to understand links between species, their habitats, and threats impacting both, and assessing the results of 'actions' implies a more dynamic situation resulting from implementing a project in an attempt to mitigate a threat or otherwise support a Species of Greatest Conservation Need.

Assessing the effectiveness of conservation actions

Monitoring plans aiming to assess project results should follow the guidance provided by the Association of Fish and Wildlife Agencies in "Measuring the Effectiveness of State Wildlife Grants" (Association of Fish and Wildlife Agencies 2011). This framework is premised on the definition of a theory of change linking the action with intermediate results, threat reduction, and the conservation target outcomes. (This approach to action planning is also supported by the Northeast Lexicon for Element 4.) Several effectiveness measures may be identified to assess intermediate results, especially in the case of actions with results expected on the long-term.

Measures of success should be (Association of Fish and Wildlife Agencies 2011) (pg 9):

- Linked – tied to key factors in the theory of change laid out in the results chain
- Measureable – in either quantitative or qualitative terms
- Precise – defined the same way by all agencies
- Consistent – unlikely to change over time
- Sensitive – changing proportionately in response to actual changes in the condition or item being measured
- Overarching – available to be measured at various points through the life of a project
- Achievable – not onerous for states or their partners to support.

To improve consistency, the suggested measures terminology used in Wildlife TRACS should be used to measure action outcomes.

Measuring population status and trend

Region-wide use of standard protocols would facilitate data-sharing and make possible an assessment of population status and trend throughout the region. Standard protocols for some

species have been developed (e.g. Grassland Bird Protocol and Standard Operating Procedures). In addition, NEAFWA has funded development of integrated, cross-jurisdictional monitoring programs and methods for New England cottontail, wood turtle, Eastern black rail, dragonflies and damselflies (Order Odonata), tidal marsh birds, and frogs. Required elements of monitoring plans differ between species groups, between species using different habitat types, and between monitoring programs with differing objectives. To enhance the possibility of comparing monitoring protocols between states, monitoring protocols should identify target species, monitoring goals (e.g. estimating abundance and trend, understanding demography, behavior, habitat use, reproduction, etc.), the reference protocol, and contact information for an office or individual familiar with the protocol.

Describing Habitat Quality

Monitoring programs for habitat quality may include soil, vegetation, climate monitoring or any variable hypothesized to influence the use of a place by a species. Unlike species population surveys which are prompted by the need for Wildlife Action Plans to describe wildlife abundance and trend, habitat monitoring is used to explain species' population trends (a research action), design conservation actions in support of single or multiple species, or measure achievement of objectives of conservation actions. Standard protocols may be useful in developing effective, efficient habitat monitoring programs. For example, the Forest Inventory and Analysis plot protocol measures tree species, age classes, shrub and herbaceous cover, snags, and fuel loads – all of which characterize forests and can be used as surrogates for wildlife habitat, not to mention assessing fire risk. The USFS Field Guide for Invasive Plant Inventory, Monitoring, and Mapping Protocol is another example of an existing tool that could be employed by Wildlife Action Plans when invasive plants threaten habitat quality. In general, habitat monitoring protocols should identify the target habitat and the purpose for monitoring.

BACKGROUND AND RATIONALE

State Wildlife Action Plan must propose plans to monitor Species of Greatest Conservation Need (Element 1) and their habitats (Element 2), for monitoring the effectiveness of conservation actions (Element 4), and for adapting these conservation actions to respond appropriately to new information or changing conditions.

The Best Practices Report recognizes that "Assessing and reporting on the success of Wildlife Action Plans as required by Element 5 is extremely challenging due to the complexity of biological and ecological interactions, and the extended timeframes often required for conservation benefits to become apparent." "Measuring the Effectiveness of State Wildlife Grants: Final Report" (Association of Fish and Wildlife Agencies 2011) provides specific guidance to compensate for these challenges.

A strong movement throughout conservation organizations toward standardized protocols supports the Northeast Lexicon philosophically and technically. The Best Practices Report specifically recommends the use of standard protocols because it facilitates data integration and provides a more complete picture of the status of wildlife across political jurisdictions and spatial scales. These best practices also recognize the importance of monitoring to demonstrate the effectiveness of conservation actions and documenting the long-term benefits to fish and wildlife populations. Projects supported by Northeast Regional Conservation Needs funds, such as The Northeast Bird Monitoring Handbook (Lambert et al. 2009) and development of regional species monitoring protocols, provide detailed guidance for species and habitat monitoring in the northeastern states. The National Park Service Inventory and Monitoring Program provides a database of standard protocols (https://irma.nps.gov/App/ProtocolTracking) which may provide a useful example for the northeast region in the future.

The exhaustive investigation of effectiveness measures published by the Association of Fish and Wildlife Agencies (Association of Fish and Wildlife Agencies 2011) and slated for incorporation in Wildlife TRACS provides a level of consistency nationwide that was seen as the best-developed guidance to date. The Northeast Regional Conservation Needs project "Regional Monitoring and Performance Framework" (Stem et al. 2008) provided earlier progress toward the standards developed in the national guidance put forth by the Association of Fish and Wildlife Agencies.

CHAPTER 6: ELEMENT 6, PLAN REVIEW

The Best Practices Report provides the most current comprehensive source for Wildlife Action Plan preparation guidance. The Best Practices Report includes valuable guidance on many topics not incorporated in the Lexicon. Here we have highlighted important aspects as a reference and focused on aspects of review that may be of interest in comparing State Wildlife Action Plans.

Table 10. Overview of plan review requirements.

Type of review	**Comprehensive Review**	**Major Revision**	**Minor Revision**
Date of Review	At a minimum, every 10 years. (October 1, 2015)	No deadline: a state may choose to do a major or minor revision at any time. These revisions do not restart the 10-year clock for comprehensive review.	
Summary of Changes	A tabular summary of any changes made as a result of any revision, and where those changes can be found is needed.		
Explanation of No Change	Document and explain why no changes were necessary after review, and describe the process used to make that determination including public review	There is no explanation needed for any sections of the document that remain unchanged after major or minor revisions.	
Web access to Plan	Wildlife Action Plans are not required to be posted online however most states do post them. A regional website listing these links would be a valuable resource for regional conservation organizations and other states. In addition, online locations for data sources, partner organizations, and any supporting information should be listed.		
Public Review	Public Review is required (Element 7&8) for the entire Wildlife Action Plan.	Public Review is required (Element 7&8) only for portions of the plan under revision.	Public Review is not required.
Documentation of Public Review	Document specific roles and measures of success for conservation partner teams that contribute information and complete tasks. Provide mechanisms for conservation partner engagement and provide regular updates (e.g. crosswalks, online comment retention)		
Taxa experts	For key taxa or other scientific questions outside the expertise of state staff, outside partners (e.g. taxa-based or targeted professional societies,		

	conservation organizations, other agencies with authority, or universities) should be engaged to develop assessments of conservation need, habitat use, threats, actions, or monitoring plans.

BACKGROUND AND RATIONALE

State Wildlife Action Plan Requirements include the need to describe procedures to review the plan at intervals not to exceed ten years.

States should refer to the Best Practices Report for additional requirements and detailed suggestions for implementing comprehensive review and major or minor revision.

CHAPTER 7: ELEMENT 7 AND 8, PUBLIC PARTICIPATION

The *public* is the general, uninvolved public and, for the purposes of Wildlife Action Plan communications, the goal is to inform them of the process and results through standard media outlets.

Stakeholders are interested or affected groups or individuals and the goal is to inform and involve them in the planning and implementation processes.

Partners are collaborators and the goal is to involve and engage them in the planning and implementation processes and inform them of progress. Wildlife Action Plans should list any formalized partnerships.

Partners usually include federal, state, and local government agencies, as well as private conservation organizations, and other parties. The following are examples of these partners:

Governmental:

- Federal agencies (e.g. US Fish and Wildlife Service, US Forest Service, US Department of Agriculture, US National Park Service, US Natural Resource Conservation Service, and any other federal agency managing natural resource within a state.)
- Tribal Nations
- State agencies (e.g. Departments of Transportation, Parks, Forests, Planning, and any other state agency affecting natural resources)
- Local municipalities (counties, townships or other municipal designation)

Non-governmental organizations:

- Non-Profit Conservation Organizations (Local, State, Regional, National)
- Recreational Organizations (Local, State, Regional, National)
- Scientific Societies and Institutions
- Academic Institutions

Committees: List committees and members. Consider needed skills, knowledge, and authority in composing committees. An example of an advisory committee charter with roles and responsibilities from Pennsylvania is provided in Appendix C.

Communications Plan: Identify key constituent groups and audiences. Set goals for each. Develop outreach strategies and vehicles for receiving input from these groups. Ask partners to help with outreach by relaying information and requests for comment to their constituents. Link the Wildlife Action Plan to established community values. (See Appendix C for an example communications plan matrix to identify audiences and outreach methods based on Bleicher.)

BACKGROUND AND RATIONALE

State Wildlife Action Plan requirements include a plan for coordinating the development, implementation, review, and revision of the plan with federal, state, and local agencies and Indian tribes that manage significant land and water areas within the state or administer programs that significantly affect the conservation of identified species and habitats.

In addition, broad public participation is an essential element of developing and implementing these plans, the projects that are carried out while these plans are developed and the species in greatest need of conservation.

States may find useful guidance in the USFWS Human Dimensions team and the Cornell University Department of Natural Resources Human Dimensions Research Unit.

SECTION IV: CONCLUSION AND RECOMMENDATIONS

Recommendation

The Northeast Association of Fish and Wildlife Agencies Fish and Wildlife Diversity Technical Committee should continue to work toward development of a regional web-accessible database to house individual state's Wildlife Action Plan content. The completed Lexicon forms the foundation of a regional database that will facilitate the sharing of information between states. Such a database will help states share information on priority species, known threats for these species and needed actions to address these threats – the required elements of State Wildlife Action Plans. A Northeast State Wildlife Action Plan database will:

1. Enhance consistency of information for species including taxonomy and nomenclature, conservation status in state, national and global systems, and literature references, preventing each state from having to individually compile this information;
2. Facilitate access to northeast State Wildlife Action Plans for state agencies, federal agencies, conservation partners, legislators and the public;
3. Facilitate more effective and efficient collaboration within and between NEAFWA states;
4. Improve accuracy of data transfers between states;
5. Assist NEAFWA in prioritizing regional conservation needs, focused on common threats across state lines.

Next Steps

Implement the common lexicon through the 2015 State Wildlife Action Plan revision process and refine language as needed.

Those participating in the development of State Wildlife Action Plans are encouraged to use this lexicon during their congressionally required comprehensive review and revision and assist in refining the language and processes as needed. Through use of the lexicon such refinements may be prompted as approaches are discovered that meet the needs with less work effort, components that work better for prioritization processes, or alternative terminology that increases the compatibility of the Northeast Lexicon with related systems nationwide.

Form a Northeast Lexicon Working Group comprised of Northeast Wildlife Diversity Program Managers and State Wildlife Action Plan Coordinators.

Achieving the ultimate vision of a web-accessible database involves several more steps, yet it can be accomplished in a relatively short timeframe given the work accomplished to date through this project. The Lexicon outlines the data content, but the database will need an

intuitive user interface, a potentially complicated network of relationships between elements, and a management system for quality control and updating data. A working group representing the northeast state agencies (Wildlife Action Plan Coordinators, Data Managers and other staff as appropriate), USFWS LCC and Region 5, and key NGO partners should be convened to advance this discussion, leading to development of a pilot database application.

Develop a Northeast State Wildlife Action Plan database application

The Northeast Lexicon Working Group and a database developer should convene to work through development steps including:

1. Define the key/priority functions of the database application (mostly done)
2. Determine the scope of the database to meet the key functions (mostly done)
3. Trial implementation of the Lexicon, with coordination and technical assistance, during Wildlife Action Plan revisions (2013-2014)
4. Develop a database application (2014)
5. Test the database (2015)
6. Refine the database as needed (2015)
7. Launch the database application (2016)

Work with the Northeast Conservation Information and Education Association to refine terminology related to outreach for incorporation in a toolkit to support states in their State Wildlife Action Plan revision and implementation.

The support of partners, stakeholders, and the public is essential to both the revision process and to the implementation of State Wildlife Action Plans. While states may differ in the composition of these audiences, the approaches used to communicate with each of them will be similar. Wildlife Action Planners anticipate using a combination of media such as websites, press releases, public events, and focused meetings to engage partners, stakeholders, and the public. The toolkit will encourage the use of common terms and shared outreach processes and methods for regional outreach consistency and effectiveness.

Conclusion

This effort has been a productive exercise in adaptive management that has reflected the evolving needs of the states and their partners in the development of the State Wildlife Action Plan revisions. State Wildlife Action Plans have been criticized for their lack of consistency in terminology that would allow wildlife managers, land managers and conservation partners to effectively and efficiently compare conservation priorities across state borders, thereby advancing landscape-scale conservation for Species of Greatest Conservation Need. The Northeast Fish and Wildlife Diversity Technical Committee had a vision to address this

shortcoming – develop a common language for State Wildlife Action Plan elements to allow the thirteen states and District of Columbia to 'roll-up' state-level priorities within a searchable framework to inform regional priorities. The foundation for the database was built through this Northeast Lexicon project. This unprecedented collaboration is nationally regarded as a model for effective landscape-scale conservation.

The Lexicon serves as a communication and coordination tool. By constructing cohesive sets of components to meet the requirements for each Wildlife Action Plan element and adopting terminology for each, the Northeast Lexicon facilitates the intra- and inter-state coordination needed to manage wildlife and their habitats with maximum efficiency and effectiveness. It facilitates translation between State Wildlife Action Plans, enables a regional context, and a formal structure through which states can learn from each other to integrate new planning resources and improve planning processes. These benefits will be maximized while states implement the Lexicon during the 2015 Wildlife Action Plan revision process.

SECTION V: REFERENCES

Akçakaya, H. R., S. Ferson, M. A. Burgman, D. A. Keith, G. M. Mace, and C. R. Todd. 2000. Making Consistent IUCN Classifications under Uncertainty. Conservation Biology 14:1001–1013.

Association of Fish and Wildlife Agencies, Teaming With Wildlife Committee, State Wildlife Action Plan (SWAP) Best Practices Working Group. 2012. Best Practices for State Wildlife Action Plans -- Voluntary Guidance to States for Revision and Implementation. Association of Fish and Wildlife Agencies, Washington, DC.

Association of Fish and Wildlife Agencies. 2011. Measuring the Effectiveness of State Wildlife Grants: Final Report. Association of Fish and Wildlife Agencies.

CMP. 2013. Open Standards for the Practice of Conservation. The Conservation Measures Partnership.

Doran, G.T. 1981. There's a SMART way to write management's goals and objectives.

Fiscal Year 2001 Commerce, Justice, State, and Related Agencies Appropriations Act. 2000. codified at U.S. Code 16 (2000) 669(c).

Foundations of Success. 2007. Using Results Chains to Improve Strategy Effectiveness: An FOS How-To Guide. Foundations of Success, Bethesda, Maryland.

Gawler, S. C. 2008. Northeastern Terrestrial Wildlife Habitat Classification. Report to the Virginia Department of Game and Inland Fisheries on behalf of the Northeast Association of Fish and Wildlife Agencies and the National Fish and Wildlife Foundation. NatureServe, Boston, MA.

IUCN Standards and Petitions Subcommittee. 2013. Guidelines for Using the IUCN Red List Categories and Criteria. Prepared by the Standards and Petitions Subcommittee. <http://www.iucnredlist.org/documents/RedListGuidelines.pdf>.

Joseph, L. N., R. F. Maloney, and H. P. Possingham. 2009. Optimal allocation of resources among threatened species: a project prioritization protocol. Conservation biology 23:328–338.

Lambert, J. D., T. P. Hodgman, E. J. Laurent, G. L. Brewer, M. J. Iliff, and R. Dettmers. 2009. The Northeast bird monitoring handbook. American Bird Conservancy, The Plains, VA. <http://sfymkuy.abcbirds.org/newsandreports/special_reports/NEBM-handbook.pdf>. Accessed 18 Oct 2013.

Lerner, J., B. Cochran, and J. Michalak. 2006. Conservation Across the Landscape: A Review of the State Wildlife Action Plans. <http://trid.trb.org/view.aspx?id=790656>. Accessed 30 Aug 2013.

Master, L. L., D. Faber-Langendoen, R. Bittman, G. A. Hammerson, B. Heidel, L. Ramsay, K. Snow, A. Teucher, and A. Tomaino. 2012. NatureServe Conservation Status Assessments: Factors for Evaluating Species and Ecosystem Risk. NatureServe, Arlington, VA.

Miller, A. F. and J. A. Cunningham. "How to avoid costly job mismatches" Management Review 70.

Naidoo, R., A. Balmford, P. J. Ferraro, S. Polasky, T. H. Ricketts, and M. Rouget. 2006. Integrating economic costs into conservation planning. Trends in Ecology & Evolution 21:681–687.

Olivero, A. P., and M. G. Anderson. 2008. Northeast Aquatic Habitat Classification System. The Nature Conservancy in collaboration with the Northeast Assoc. of Fish and Wildlife Agencies, Boston, MA.

Salafsky, N., D. Salzer, J. Ervin, T. Boucher, and W. Ostlie. 2003. Conventions for Defining, Naming, Measuring, Combining, and Mapping Threats in Conservation: An Initial Proposal for a Standard System.

Salafsky, N., D. Salzer, A. J. Stattersfield, C. Hilton-Taylor, R. Neugarten, S. H. M. Butchart, B. Collen, N. Cox, L. L. Master, S. O'connor, and D. Wilkie. 2008. A Standard Lexicon for Biodiversity Conservation: Unified Classifications of Threats and Actions. Conservation Biology 22:897–911.

Stem, C., V. Swaminathan, N. Salafsky, T. Tomajer, and Kart, Jon. 2008. Monitoring the Conservation of Fish and Wildlife in the Northeast: A Report on the Monitoring and Performance Reporting Framework for the Northeast Association of Fish and Wildlife Agencies. Regional Conservation Needs Grant Final Report, Foundations of Success.

SECTION VI: APPENDICES

APPENDIX A: JUNE 2013 LITERATURE REVIEW

This report was prepared for the Northeast Fish and Wildlife Diversity Technical Committee by Stephanie Egger through Terwilliger Consulting, Inc..

Synthesizing and Summarizing Conservation Decision Tools for State Wildlife Action Plans (Final June, 2013)

A State Wildlife Action Plan (SWAP) database tool is envisioned by the Northeast Fish and Wildlife Diversity Technical Committee (NEFWDT) to be a tool primarily for delivery of SWAPs, and secondarily for development of plans. Language and consistent operational definitions for important terms (e.g. threats, conservation actions, habitats), and the agreement to the use of those terms and their operational definitions, are needed for species of greatest conservation need (SGCN). The following will examine the similarities and differences between the agreed-to terms (per Philadelphia meeting) of the Northeast (NE) Region Draft "lexicon" and other similar efforts undertaken, developed and published by conservation organizations and within peer-reviewed literature. This literature review report strives to contribute to advancing common agreement on terms and definitions.

Threats assessment for SGCN

Preliminary terms were chosen by NEFWDT to describe threat assessment and include *Spatial Extent*, *Intensity*, *Reversibility*, *Likelihood of Impact and Occurrence*, *Cumulative and Compounding*, *Immediacy*, *Duration*, and *Persistence*. These terms were then compared with terminology for threats found through the literature search (Table 1). The same or analogous terms were found for *Spatial Extent* (*scope*), *Intensity* (*severity*), *Reversibility* (*irreversibility*), *Likelihood of Impact and Occurrence* (*probability*), and *Immediacy* (*urgency*). Further details regarding the definition of the terminology and scoring/ranking criteria are described below and also included in Appendix A. For a regional approach any combination of these threat criteria can be used to identify the dominant, regional threats for a given ecoregion. Rationalization for conducting a regional approach of threats will only be increased as more terms are considered in an assessment (Wisdom et al. 2003).

Spatial Extent

The NE Draft Lexicon defines *Spatial Extent* as the percentage of threat to the applicable area - distribution of threat within a state (spp, habitat or threat. However, the term *scope* was used more often by conservation organizations and throughout the literature rather than *Spatial Extent*. Earlier versions of threat assessment by organization used the term *extent* such in TNC Southeastern Division (2003) and WWF (Ervin 2002) or other terms such as *proportion of the area*/*area* have also been used (WCS Living Landscapes and Salafsky & Margoluis 1999). *Spatial Extent* or *pervasiveness* of the threat across the ecoregion was used by Wisdom et al. (2003).

In the NE Draft Lexicon, *Spatial Extent* of threats is scored/ranked by percentages 76-100%, 51-75%, 26-50%, and 0-25%. NatureServe (2012) scored *scope* by percentages into *pervasive* (71-100%), *large* (31-70%), *restricted* (11-30%), *small* (1-10%). IUCN (2102) *scope* categories include *whole*, *majority*, *minority*, and *negligible*, while TNC (2007) categorizes *scope* into *very high*, *high*, *medium*, and *low* categories. CMP (2007) and WWF (2007) also assumes the same categories as TNC (2007) and ranks *scope* by percentages similar to NatureServe (2012)

Specific Threat Variables Used by Different Systems Variables in each column are used in an analogous fashion.

Systems	Variables Used by Different Systems									
NatureServe April 2012	Scope	Severity					Timing (immediacy)	Impact Magnitude		
IUCN 2012	Scope	Severity						Impact		
TNC CAP 2007	Scope	Severity	Contribution	Irreversibility						
TNC's SE Division 2003	Extent (% targets)	Severity								
TNC 5-S (precursor to CAP) 2000	Scope (spatial)	Severity	Contribution	Irreversibility						
CMP. 2007. Open Standards	Scope	Severity		Permanence/ Irreversibility			Urgency			
WWF Project & Programme Standards 2007	Scope	Severity		Irreversibility Permanence						
WWF RAPPAM 2002	Extent			Permanence	Probability			Impact & Trend		
WWF Root Causes	Scope			Permanence				Impact		
Ecoregional Assessments: Standard 10. 2006	Scope	Severity					Time			
WCS Living Landscapes	Proportion	Severity		Recovery Time	Probability		Urgency			
Salafsky et al. 2003	Scope	Severity	Contribution	Reversibility	Likelihood		Timing	Magnitude (Scope and Severity)		
Bunnell et al.2009							Immediacy	Magnitude		
Salafsky & Margoluis 1999	Area	Intensity					Urgency			
Wisdom et al. 2003	Spatial Extent								Timeframe required	
Case Study: Caribbean										Persistence
Florida WAP	Scope	Severity		Irreversibility				Degree to which they contribute		
Draft NE Lexicon	**Spatial Extent**	**Intensity**		**Reversibility**	**Likelihood of Impact and Occurrence**	**Cumulative and Compounding**	**Immediacy**		**Duration**	**Persistence**

very high (71-100%), *high* (31–70%), *medium* (11–30%) and *low* (1-10%). The Ecoregional Assessment and Biodiversity Vision Toolbox (2006) categorizes *scope* of threats and their *severity* to the target occurrences and areas as *widespread* (>50% are affected by the threat), *common* (10-50%), and *limited* (<10%). Salafsky et al. (2003) rated *scope* much differently and subdivided *scope* into *scope* (*spatia*l) and *scope* (*percentage of targets*): *Scope* (*spatial*) is defined as the area of the project site (or target occurrence) affected by a threat within 10 years (4 = *throughout* (>50%), 3 = *widespread* (15 – 50%), 2 = *scattered* (5 – 15%), 1 = *localized* (< 5%)). *Scope* (*percentage of targets*) is defined as the number of target occurrences affected by a threat within 10 years (4 = *most or all* (>50%), 3 = *many* (25 – 50%), 2 = *some* (5 – 25%), 1 = *few* (< 5%)).

Intensity

The NE Draft Lexicon defines *Intensity* similar to the way others define *severity* of threat. The term *severity* was used more often by conservation organizations and throughout the literature than *Intensity*. Other than in the NE Draft Lexicon, the term *Intensity* was only used in Salafsky and Margoluis 1999.

NatureServe (2012) and others WAPS (e.g. Florida Wildlife Conservation Strategy) do not use the past threats to describe threat impact, considering only present and future threats, whereas IUCN allows for past, ongoing, or future. NatureServe, IUCN, CMP, TNC, WWF all use a similar time frame for assessing the *severity* of threats either within a 10-year window or three species generation time frame whichever is longer (not to exceed 100 years). However, TNC (2000, 2007) also measures *severity* as the level of damage to the conservation target that can reasonably be expected within 10 years under current circumstances. TNC (2007) makes note that some threats, such as climate change or invasive species may not fully express themselves over a 10-year time frame. To this end, practitioners may wish to consider a longer time horizon for some threats if appropriate but should be sure to document their decisions. Similar effort such as Florida WAP (2005) and Salafsky et al (2003) measure the degree to which a threat has an impact on the viability/integrity of targets within the project area within 10 years only.

In the NE Draft Lexicon, the proposed categories for scoring/ranking the *severity* of threats are *high*, *medium* and *low*; and are similar to TNC (2007) and CMP (2007) that measures *very high*, *high*, *medium*, and *low*. IUCN categories for *severity* include *very rapid*, *rapid*, *slow*, and *negligible* (IUCN 2012). CMP (2007) and WWF (2007) scored *severity* by percentages and similar category terms: *Very High* (71–100%), *High* (31–70%), *Medium* (11–30%), and *Low* (1–10%). NatureServe (2012) is also scored by percentages, but by different category terms: *extreme* (71–100%), *serious* (31–70%), *moderate* (11–30%), *slight* (1–10%). Salafsky et al (2003) rated *severity* much differently (4 = *serious damage or loss*, 3 = *significant damage*, 2 = *moderate damage*, 1 = *little or no damage*).

Reversibility

The NE Draft Lexicon defines *Reversibility* as the degree to which the impact of the threat is reversible. *Reversibility* was used by different conservation organization and the literature as well as the terms *irreversibility* and *permanence.*

The NE Draft Lexicon scores *Reversibility* with a yes/no option. CMP (2007) and WWF (2007) ranks/score *permanence* (*irreversibility*) as *very high* - the effects of the threat cannot be reversed, it is very unlikely the target can be restored, and/or it would take more than 100 years to achieve this; *high* - the effects of the threat can technically be reversed and the target restored, but it is not practically affordable and/or it would take 21–100 years to achieve this; *medium* - the effects of the threat can be reversed and the target restored with a reasonable commitment of resources and/or within 6–20 years; and *low*- the effects of the threat are easily reversible and the target can be easily restored at a relatively low cost and/or within 0–5 years.

While Salafsky et al. (2003) scored/ranked *Reversibility* numerically: 4 = *irreversible* e.g., extinction, 3 = *reversible with difficulty*, 2 = *reversible with some difficulty* and 1 = *easily reversible*.

Likelihood of Impact and Occurrence

The NE Draft Lexicon uses similar terms to those found in the literature, *likelihood* and *probability*, but was only seen in Salafsky et al. (2003), WWF (2002), and WCS (2002). The NE Draft Lexicon scored *Likelihood of Impact* and *Occurrence* as *high*, *medium*, *low*, and *none*. Salafsky et al. (2003) score/ranked *likelihood* as the probability that a threat will occur within the next 10 years numerically: 4 = *existing threat* (100%), 3 = *high probability* (50-99%), 2 = *moderate probability* (10-49%) and 1 = *low probability* (0-9%).

Cumulative and Compounding

No similar terms or scoring/ranking criteria was found during this literature search.

**Internal note: Do we need to revisit whether to should include Cumulative and Compounding?

Immediacy

The NE Draft Lexicon defines *Immediacy* as the temporal scale of the threat. Other interchangeable terms such as *urgency* (Salafsky and Margoluis 1999, WCS 2002, CMP 2007) and *timing* (Salafsky et al. 2003 and Ecoregional Assessment and Biodiversity Vision Toolbox 2006,) as well as *immediacy* (Bunnell et al. 2009 and NatureServe 2012) were found during the literature search.

The NE Draft Lexicon scored *Immediacy* as *long term*, *near term*, and *now*, which is similar to NatureServe (2012) and Salafsky et al. (2003). NatureServe (2012) scores *timing* (*Immediacy*) as *high* (continuing), *moderate* (could happen in the short term), *low* (could happen in the long term), and *insignificant/negligible* (only in the past and unlikely to return). This scoring was based on Birdlife International and draft proposed IUCN-CMP (and NatureServe) scoring of threat timing. Salafsky et al. (2003) defined *timing* as the time until a threat will start having impact on targets and scored it numerically: 4 = *current* (< 1 year), 3 = *imminent* (1-3 years), 2 = *near-term* (3-10 years), and 1 = *long-term* (> 10 years). Bunnell et al. (2009) scored *Immediacy* of the threat as *high*, *medium* and *low*.

Duration

The NE Draft Lexicon scored *Duration* as *less than a year*, *1–5 years*, *6–10 years*, or *greater than 10 years*. One term found during the literature search is *timeframe required* (to implement effective treatments across the ecoregion); although no scoring was available (Wisdom et. al 2003). No terms analogous to *Duration* were found.

**Internal note: Does this mean we should revisit inclusion of Duration?

Persistence

The NE Draft Lexicon defines *Persistence* as the "degree to which the cause (threat) is persistent over time in the absence of action" and scored it as *inevitable*, *highly likely*, *probable*, *unlikely*, and *none*. In this search of the literature, only one source was found that used *Persistence* (Case Study 2006). This use of "persistence" was not analogous to that defined in the NE Draft Lexicon as it referred to the persistence of the target as opposed to the threat, i.e., *Persistence* was defined as "the degree to which a particular habitat, community or population will tend to retain its present status should the current level of human pressure on the system remain unchanged. *Persistence* was scored/ranked as *highest*, *high*, *moderate*, *low*, and *unknown* (Case Study 2006).

Threat terms used by others with no analogous term in the NE Draft Lexicon

Contribution

TNC (2000, 2007) similarly define *contribution* as the expected contribution of the source, acting alone, to the full expression of a stress (as determined in the stress assessment) under current circumstances (i.e., given the

continuation of the existing management/conservation situation). TNC (2007) scored/ranked *contribution* as *very high* - the source is a very large contributor of the particular stress; *high* - the source is a large contributor of the particular stress; *medium* - the source is a moderate contributor of the particular stress; and *low* - the source is a low contributor of the particular stress. Salafsky et al. 2003 also include *contribution* as a threat assessment term, defining it as the degree to which a threat causes multiple and cascading threats and/or has widespread ecological impact, scoring it numerically as 4 = *very high*, 3 = *high*, 2 = *moderate*, and 1 = *low.*

*Impact/*Magnitude

NatureServe (2012) defined threat *impact* (or *magnitude*) as the degree to which a species or ecosystem is observed, inferred, or suspected to be directly or indirectly threatened in the area of interest. The *impact* of a threat is based on the interaction between assigned *scope* and *severity* values, and includes categories of *very high* (75% declines), *high* (40%), *medium* (15%) and *low* (3%). Threat *impact* is calculated considering only present and future threats. IUCN (2012) has a similar definition and scoring. Threat *impact* scores are a measure between *scope* and *severity* values and include categories of *high impact*, *medium impact*, *low impact*, and *negligible/no impact* (IUCN 2012). However, WWF (Ervin 2002) defined *impact* differently as "the degree, either directly or indirectly, to which the threat affects overall protected area resources."

Literature Cited:

Baldwin, R.F. and P.G. deMaynadier. 2009. Assessing threats to pool-breeding amphibian habitat in an urbanizing landscape. Biological Conservation 142: 1628–1638.

Bunnell , F.L., D.F. Fraser, and A.P. Harcombe. 2009. Increasing Effectiveness of Conservation Decisions: A System and its Application. Natural Areas Journal 29 (1): 79-90.

CMP. 2007. Open Standards for the Practice of Conservation. Conservation Measures Partnership.

Ecoregional Assessment and Biodiversity Vision Toolbox. October 2006. Standard 10. Accessed 2013. http://conserveonline.org/workspaces/cbdgateway/era/standards/std_10

Ecoregional Assessment and Biodiversity Vision Toolbox. February 2006. Case Study: Assessment of Threats to the Marine Biodiversity of the Caribbean using Expert Workshops. 7 pp.

Ervin, J. 2002. WWF Rapid Assessment and Prioritization of Protected Area Management (RAPPAM) Methodology. WWF, Gland, Switzerland.

Florida Fish and Wildlife Conservation Commission. 2005. Florida's Wildlife Legacy Initiative. Florida's Comprehensive Wildlife Conservation Strategy. Tallahassee, Florida, USA. 540 pp.

IUCN. December 2012. Threat Classification Scheme Version 3.2. Accessed 2013. http://www.iucnredlist.org/documents/Dec_2012_Guidance_Threats_Classification_Scheme.pdf

Master, L. L., D. Faber-Langendoen, R. Bittman, G. A. Hammerson, B. Heidel, L. Ramsay, K. Snow, A. Teucher, and A. Tomaino. 2012. NatureServe Conservation Status Assessments: Factors for Evaluating Species and Ecosystem Risk. NatureServe, Arlington, Virginia.

Salafsky, N. and R. Margoluis. 1999. Threat reduction assessment: A practical and cost-effective approach to evaluating conservation and development projects. Conservation Biology **13**: 1830-841.

Salafsky N., Salzer, D., Ervin, J., Boucher, T., and W. Ostlie. 2003. Conventions for Defining, Naming, Measuring, Combining, and Mapping Threats in Conservation An Initial Proposal for a Standard System (Draft Version) 35 pp.

Salafsky, N., D. Salzer, A.J. Stattersfield, C. Hilton-Taylor, R. Neugarten, S. H.M. Butchart, B.Collen, and N. Cox. 2008. A Standard Lexicon for Biodiversity Conservation: Unified Classifications of Threats and Actions. Conservation Biology. 15 pp.

TNC. 2000. The Five-S Framework for Site Conservation: A Practitioner's Handbook for Site Conservation Planning and Measuring Conservation Success, Volume I, Second Edition. The Nature Conservancy, Arlington, Virginia.

TNC Southeastern Division. 2003. Process to Sequence Conservation Actions in the Southeast Division. The Nature Conservancy, Arlington, Virginia.

TNC. 2007. Guidance for Step 4: Identify Critical Threats in Conservation Action Planning Handbook (CAP). The Nature Conservancy, Arlington, Virginia.

WCS. 2002. Using conceptual models to set conservation priorities. Living Landscapes Bulletin 5: 1-4.

Wisdom, M. J., M. M. Rowland, L. H. Suring, L. Schueck, C. Wolff Meinke, B. C. Wales, and S. T. Knick. 2003. Procedures for regional assessment of habitats for species of conservation concern in the sagebrush ecosystem. March 2003 Report, Version 1, Pacific Northwest Research Station, 1401 Gekeler Lane, La Grande, Oregon. 153 pp.

WWF. July 2007. Resources for Implementing the WWF Project & Programme Standards Step 1.4 Define: Threat Ranking. 11 pp.

Conservation Actions assessment for SGCN

Preliminary terms were chosen by NEFWDT to describe conservation action assessment and include *Feasibility*, *Effectiveness*, *Funding Availability*, *Capacity Internal and External*, *Immediacy*, *Sequencing*, *Support for Action*, *Duration*, and *Cost Estimate*. These terms were then compared with terminology for conservation action assessment found through the literature search (Table 2). The same or analogous terms were found for *Feasibility* (*probability*

Table 2. Specific Conservation Action Variables Used by Different Systems Variables in each column are used in an analogous fashion.

Systems	Variables Used by Different Systems									
NatureServe April 2012	Probability of Success			Availability of Funds	Personnel to carry out such actions & Legal frameworks					
IUCN 2012	Probability of success			Availability of Funds	Personnel to carry out such actions & Legal frameworks					
TNC CAP 2007	Feasibility ➢ Lead individual and institution ➢ Ability to motivate key constituencies ➢ Ease of implementation		Benefits? ➢ Scope and scale of outcome ➢ Contribution ➢ Duration ➢ Leverage						Duration (subhead of Benefits)	Cost ➢ One time cost ➢ Annual costs ➢ Staff time ➢ Number of years
TNC Ecoregional Status Measures Version 1.0 2007		Intent	Effective Management Potential						Tenure	
TNC Southern U.S. Regional Office 2006	Feasibility		Leverage	Funding				Presence of Support in Key Agencies & Partners/ AND Stakeholder Support/ Opportunity		
TNC 5-S (precursor to CAP) 2003				Adequate Funding	Project Leadership and Support		Strategic Approach			
TNC Landscape Practioners Handbook 2003	Feasibility ➢ Lead individual and institution ➢ Ability to motivate key constituencies ➢ Ease of implementation		Benefit? ➢ Threat Abatement ➢ Viability Enhancement ➢ Contribution ➢ Duration ➢ Leverage	Funding	Leadership and Support AND Legal Framework			Community & Constituency Support	Duration (subhead of Benefits)	Cost
CMP. 2007. Open Standards	Feasibility		Potential Impact							
NC WAP Chapter 6 Synthesis of Conservation Priorities	Feasibility (cost/ benefits analysis)		Benefit	Funding				Partnerships/ Opportunity		

Georgia WAP	Probability of Success		Providing Multiple Benefits for High Priority Species/Habitats & Overall Importance	Addressing Un(der)funded Needs		Timeliness or Urgency	Connections with Other Conservation Actions	Building Public Support		
Florida WAP	Feasibility		Benefit				Sequencing (not included but mentioned as important)			Cost
Davis et al. 2003	Feasibility							Flexibility (engaging stakeholders)		
Bunnell et al.2009	Feasibility									
Draft NE Lexicon	**Feasibility**		**Effectiveness**	**Funding Availability**	**Capacity Internal and External**	**Immediacy**	**Sequencing**	**Support For Action**	**Duration**	**Cost Estimate**

of success), *Effectiveness* (*benefit*), *Funding Availability*, *Capacity Internal and External* (*leadership and support & legal framework*), *Support for Action* (*stakeholder support*), *Duration,* and *Cost Estimate*. Further details regarding the definition of the terminology and scoring/ranking criteria are described below and also included in Appendix B. Specific conservation action variables used by different systems were compared in an analogous fashion.

Feasibility

The NE Draft Lexicon defined *Feasibility* as conservation action that is capable of being done or carried out; capable of being used or dealt with successfully; reasonable, likely. *Feasibility* was a common term used to evaluate conservation actions found within the literature (Sutter and Szell 2006, TNC 2003 and 2007, CMP 2007, NC WAP 2005, FL WAP 2005, Davis et al. 2003, Bunnell et al. 2009). TNC (2006) elaborated on this definition as a measure of how likely conservation success (based on conservation of the majority of conservation targets by implementation of priority strategies) can be obtained at a conservation area. Further, Feasibility is a combination of the ease of implementation of the project (for example, logistics, number of landowners) and the ecological integrity of the site (TNC 2006). TNC (2007) emphasizes that overall *Feasibility* of a strategic action is based on three factors: Lead individual and institution, the ability to motivate key constituencies, and the ease of implementation. NC and Florida WAPS more simply define *Feasibility* as a cost/benefit analysis and the ease of implementation, respectively. Bunnell et al. 2009 adds that *Feasibility* has little relation to status or risk, but is critical in planning and establishing priorities. NatureServe (2012), IUCN (2012), and the Georgia WAP (2005) used a different term, *probability of success*. The Georgia WAP (2005) defines *probability of success* as the conservation action is likely to succeed because it employs tested methodologies, has strong support from stakeholders, and has clearly identified and readily achievable objectives.

The NE Draft Lexicon scored/ranked *Feasibility* as 1 (l*ow capacity for being done*/*carried out*) to 3 (*high capacity for being done*/*carried out*. TNC (2003) did score/rank three factors that contribute to *Feasibility* from *very high*, *high*, *medium*, and *low* for lead individual and institution, the ability to motivate key constituencies, and the ease of implementation. CMP (2007) also scores/ranks *Feasibility* on a similar scale (*very high* to *low*) and Bunnell et al. (2009) *high*, *medium*, and *low*.

Effectiveness

The NE Draft Lexicon defines *Effectiveness* as producing a decided, decisive, or desired effect. Only TNC (2007) used a similar term, *effective management potential* which was defined as the potential for an entity to be effective in implementing activities to achieve stated protection and/or management objectives. Other analogous terms that were used were *benefit*, *potential impact leverage*, and *providing multiple benefits for high priority species/habitats* & *overall importance*. *Benefit* was further defined as *scope* and *scale of outcome*, *contribution*, *duration* and *leverage* by TNC (Higgins et al. 2007). TNC (Low 2003) also further defined *benefit* as *threat abatement*, *viability*, and *enhancement*, as well as *contribution*, *duration*, *leverage*. Both the North Carolina (2005) and Florida (2005) WAPS included the term *benefit* in their conservation action assessments. CMP (2007) used the term *potential impact* and asked the question if implemented will the strategy lead to desired changes in the situation at the project site?

The NE Draft Lexicon scores *Effectiveness* as 1 (*low probability of having desired effect*) to 3 (*high probability of having desired effect*). *Effective management potential* was ranked by TNC (Higgins et al. 2007) as *very good* (*adequate likelihood*, *fair* (*inadequate likelihood*) and *poor* (*no likelihood*) of activities achieving the designated intent. CMP (2007) scoring/ranking of *potential impact* was *very high*, *high*, *medium*, and *low* for contributing to meaningful threat mitigation or target restoration. TNC (Low 2003) scored the individual components under *benefit* (also *threat abatement*, *viability*, *enhancement*, *contribution*, *duration* and *leverage*) on a similar scale (*very high* to *low*). Florida WAP also ranked similarly.

Funding Availability

The NE Draft Lexicon described *Funding Availability* as present and ready for use; at hand; accessible; capable of being gotten; obtainable. Several other organizations noted the importance of *Funding Availability* when assessing

conservation actions (e.g. NatureServe 2012, IUCN 2012, TNC 2003 and 2006). Funding may come from both private and public sectors and be available through a variety of mechanisms and sources, such as appropriation of public funds, contributions by donors, endowment, and other sources (Low 2003) or match opportunities (NC WAP 2005).

The NE Draft Lexicon scored/ranked *Funding Availability* as 3 (*funding in hand*), 2 (*funding is available but no earmarked*), and 1 (*no funding*). TNC (2006) ranked *funding* on an ordinal scale *very high*, *high*, *medium*, or *low* and then translated into numeric values from 1-4 (*low* = 1, *very high* =4) and funding was weighted by 2. TNC (Low 2003) ranked funding on a similar scale, *very high* to *low*.

Capacity Internal and External

The NE Draft Lexicon described *Capacity Internal and External* as the facility or power to produce, perform, or deploy individual actions not the plan as a whole. NatureServe (2012) and IUCN (2012) described similar actions such as the *personnel to carry out such actions* & *legal frameworks* similar to TNC (Low 2003) with *leadership and support* & *legal framework* and TNC (2003) *project leadership and support*. Low (2003) describes the necessary *staff leadership*, *multidisciplinary team* (could be onsite or partner organizations), and *institutional leadership* (some combination of institutions is providing leadership for developing and implementing conservation strategies at the project area). *Legal framework* includes the existence of an appropriate framework of protection tools and policy instruments that can be deployed to secure enduring conservation results at the project area (Low 2003).

The NE Draft Lexicon separate *capacity* into 2 questions – internal and external and ranked each as 3 (*all capacity to perform is in place*), 2 (*some, but inadequate*), and 1 (*no capacity*). TNC (Low 2003) ranks *leadership and support* & *legal framework* on a scale of *very high*, *high*, *medium*, and *low*.

Immediacy

The NE Draft Lexicon defined *Immediacy* as when something is important or urgent because it relates to a situation that is happening now. Similarly, the Georgia WAP (2005) used the terms *timeliness* or *urgency* as the conservation action that addresses a problem that is particularly urgent. If this specific action is not implemented or continued in the next ten years, the state will experience a significant loss of biological diversity or habitat quality. No other sources in the literature search produced the term *Immediacy* or an analogous term.

The NE Draft Lexicon ranked *Immediacy* at 3 (*now*), 2 (*near term*), and 1 (*long term*).

Sequencing

The NE Draft Lexicon defined *Sequencing* as an action that is one of several that must be done in some order. In the Florida WAP (2005) *Sequencing* was not included, but mentioned as an important conservation action to consider. In the Georgia WAP (2005) *connections with other conservation actions* serves as a critical component that enables or facilitates one to several other important conservation measures. Without this component, other efforts will be crippled or made ineffectual. TNC (2003) offered a *strategic approach* term. No other literature sources from this search yielded terms analogous to "sequencing."

The NE Draft Lexicon ranks *Sequencing* as 1 (*step 3 or more*), 2 (*step 2*), 3 (*first step of 2 or more*), or 4 only step in sequence and will add a factor of dependency of *yes*/*no*.

Support for Action

In the NE Draft Lexicon *Support for Action* was defined as social/political/landowner ability to approve of an action and help it to be successful. TNC (2006) suggested the *presence of support in key agencies/partners* and *stakeholder support/opportunity* as well *community & constituency support* (TNC (Low 2003)) as conservation action assessment terms similar to *Support for Action*. NC WAP (2005) and Georgia WAP (2005) offer *partnerships/opportunity* and

building public support, respectively, as similar conservation assessment terms. Davis et al. 2003 also contributed the *flexibility* (engaging stakeholders).

The NE Draft Lexicon ranks *Support for Action* as 1 (*no support*) to 3 or 5 (*very high support*).
TNC (2006) ranked *presence of support in key agencies/partners* and *policy and constituency (stakeholder) support* on an ordinal scale (*low*, *medium*, *high*, or *very high)* for assessing relative conservation opportunities. Both *presence of key agencies/partners* and *policy and constituency (stakeholder) support* were weighted by 1.5. Similarly, TNC (Low 2003) ranked *community & constituency support* as *very high*, *high*, *medium*, and *low*.

Duration

Duration is another term that the NE Draft Lexicon intends to include. In both TNC (2006) and TNC (Low 2003) *Duration* was included as a subheading under *benefits* and subsequently placed in the similar column as *Effectiveness* for the NE Draft Lexicon Terminology). However, it could also be included as a stand-alone term as well. TNC (Higgins et al. 2007) includes the term *tenure* defined as the duration of the commitment to the protection and/or management activities. *Tenure* is measured by *very good* (permanent) (or in perpetuity), *good* (long-term commitment) (25 years or greater), *fair* (short-term commitment) (less than 25 years) commitment, or *poor* (no Commitment).

**Internal note: It is unclear whether NE Lexicon wanted "duration" to reflect the time commitment required (i.e., the need for sustained action over time vs. short term action). The TNC use seems to be about the likelihood of a sustained duration i.e., the time commitment available. NE will need to be clear on this and draw the comparison based on what we determine.

Cost Estimate

The NE Draft Lexicon defines *Cost Estimate* as the approximation of the cost of a program, project, or operation. The *Cost Estimate* is the product of the cost estimating process. The *Cost Estimate* has a single total value and may have identifiable component values. A few of the literature sources provided *cost* as a conservation action assessment consideration. TNC (2007) further broke down *cost* as *one time cost*, *annual costs*, *staff time*, and *number of years*. TNC (Low 2003) defined *cost* as *cost in discretionary dollars* – estimate the total cost of implementing the Strategic Action, including staff time, in unrestricted or discretionary dollars that are available to the project. The Florida WAP (2005) defines *cost* as the order of magnitude in dollars with the total cost of implementing the action estimated for the time horizon of the action, but no longer than 10 years.

**Internal note: NE will need to be clear about how we want this term applied, annual costs? Total costs? For duration? For no more than 10 years?

TNC (Low 2003) ranked *cost* as *very high* (total cost is $1,000,000 or more), *high* (total cost is $100,000 or more), *medium* (total cost is $10,000 or more), and *low* (total cost is less than $10,000).

Literature Cited:

Bunnell , F.L., D.F. Fraser, and A.P. Harcombe. 2009. Increasing Effectiveness of Conservation Decisions: A System and its Application. Natural Areas Journal 29(1):79-90.

CMP. 2007. Open Standards for the Practice of Conservation. Conservation Measures Partnership.

Davis, F.W., D.M. Stoms, et al. 2003. A framework for setting land conservation priorities using multi-criteria scoring and an optimal fund allocation strategy, University of California, Santa Barbara, National Center for Ecological Analysis and Synthesis: 72 pp.

Florida Fish and Wildlife Conservation Commission. 2005. Florida's Wildlife Legacy Initiative. Florida's Comprehensive Wildlife Conservation Strategy. Tallahassee, Florida, USA. 540 pp.

Georgia Department of Natural Resources Wildlife Resources Division. August 2005. A Comprehensive Wildlife Conservation Strategy for Georgia. Appendix L. 202 pp.+ Appendices.

Higgins, J., R, Unnasch, and C. Supples. 2007. Ecoregional Status Measures Version 1.0 Framework and Technical Guidance To Estimate Effective Conservation. The Nature Conservancy. 123 pp.

IUCN. 2012. Guidelines for Application of IUCN Red List Criteria at Regional and National Levels: Version 4.0. Gland, Switzerland and Cambridge, UK: IUCN. iii + 41pp.

Low, G. 2003. Developing Strategies, Taking Action & Measuring Success LANDSCAPE – SCALE CONSERVATIONA Practitioner's Guide. The Nature Conservancy. 62 pp.

Margules, C.R., R.L. Pressey, and P.H. Williams. 2002. Representing biodiversity: data and procedures for identifying priority areas for conservation. Journal of Biosciences 27(4 supplement 2): 309-326.

Master, L. L., D. Faber-Langendoen, R. Bittman, G. A. Hammerson, B. Heidel, L. Ramsay, K. Snow, A. Teucher, and A. Tomaino. 2012. NatureServe Conservation Status Assessments: Factors for Evaluating Species and Ecosystem Risk. NatureServe, Arlington, Virginia.

North Carolina Wildlife Resources Commission. 2005. North Carolina Wildlife Action Plan. Synthesis of Conservation Priorities Criteria to Set Conservation Priorities. Chapter 6. Raleigh, North Carolina. 12 pp.

Salafsky, N., R. Margoluis, K.H. Redford, and J.G. Robinson. 2002. Improving the practice of conservation: A conceptual framework and research agenda for conservation science. Conservation Biology 16: 1469-1479.

Salafsky, N., D. Salzer, A.J. Stattersfield, C. Hilton-Taylor, R. Neugarten, S. H.M. Butchart, B.Collen, and N. Cox. 2008. A Standard Lexicon for Biodiversity Conservation: Unified Classifications of Threats and Actions. Conservation Biology: 15 pp.

Sutter, R.D., and C.C. Szell. 2006. Sequencing Conservation Actions Through Threat Assessments in the Southeastern United States, The Nature Conservancy Durham, North Carolina. USDA Forest Service Proceedings RMRS-P-42CD. 10 pp.

TNC. 2003. The Enhanced 5-S Project Management Process: An Overview of Proposed Standards for Developing Strategies, Taking Action, and Measuring Effectiveness and Status at Any Scale. The Nature Conservancy, Arlington, Virginia. 58 pp.

TNC. 2007. Guidance for Step 4: Identify Critical Threats in Conservation Action Planning Handbook (CAP). The Nature Conservancy, Arlington, Virginia. 16 pp.

Identification of SGCN

Most SWAPs refer to the National and State Rank criteria as the develop SGCN list in addition to other lists from Birds of Conservation Concern or Other approved or peer reviewed regional plans and systems including (Partners in Flight, Bird Conservation Regions, U.S. Fish and Wildlife Service, American Fisheries Society etc.). Further details regarding the definitions of the scoring/ranking criteria are included in Appendix C.

This literature search included the Arizona SWAP, which did not base their selection of SGCN on such criteria. Arizona SWAP notes "This vulnerability assessment did not use available national or global vulnerability rankings (e.g.,

NatureServe) because rankings based on species evaluations across their entire geographical distribution are too coarsely scaled. Also no attempt to match rankings done previously by the Department (e.g., Wildlife of Special Concern in Arizona, or rankings done by other agencies or entities, e.g., U.S. Forest Service Southwestern Region Sensitive Animals list , Bureau of Land Management sensitive species list for Arizona, Birds of Conservation Concern 2008, Southwest Partners in Amphibian and Reptile Conservation (PARC) again because of issues of scale, as well as differing management and conservation priorities across agencies, NGOs, etc. It is important to note that lists compiled by other entities are based on other, perhaps similar or dissimilar, criteria in different geographic and management settings, therefore the resulting vulnerability ranks herein are not meant to replace, update or invalidate any of those lists."

Literature Cited:

Arkansas Game and Fish Commission. 2005 (Revised October 2006). The Arkansas Comprehensive Wildlife Conservation Strategy. 1647 pp. + Appendices.

Faber-Langendoen, D., J. Nichols, L. Master, K. Snow, A. Tomaino, R. Bittman, G. Hammerson, B. Heidel, L. Ramsay, A. Teucher, and B. Young. June 2012. NatureServe Conservation Status Assessments: Methodology for Assigning Ranks. NatureServe, Arlington, Virginia.

Florida Fish and Wildlife Conservation Commission. 2005. Florida's Wildlife Legacy Initiative. Florida's Comprehensive Wildlife Conservation Strategy. Tallahassee, Florida, USA. 540 pp.

Georgia Department of Natural Resources Wildlife Resources Division. August 2005. A Comprehensive Wildlife Conservation Strategy for Georgia. Appendix A. 202 pp.+ Appendices.

IUCN. (2012a). IUCN Red List Categories and Criteria: Version 3.1. Second edition. Gland, Switzerland and Cambridge, UK: IUCN. iv + 32pp.

IUCN. (2012b). Guidelines for Application of IUCN Red List Criteria at Regional and National Levels: Version 4.0. Gland, Switzerland and Cambridge, UK: IUCN. iii + 41pp.

Mississippi Museum of Natural Science. 2005. Mississippi's Comprehensive Wildlife Conservation Strategy. Mississippi Department of Wildlife, Fisheries and Parks, Mississippi Museum of Natural Science, Jackson, Mississippi. 428 pp.

Panjabi, A. O., P. J. Blancher, R. Dettmers, and K. V. Rosenberg, Version 2012. Partners in Flight Technical Series No. 3. Rocky Mountain Bird Observatory website: http://www.rmbo.org/pubs/downloads/Handbook2012.pdf

Abundance and Trends of SGCN

Florida WAP (2005) and Mississippi WAP (2005) used similar categories for describing species trends: *Declining*, *Stable*, and *Increasing*. Florida WAP (2005) also adds the *Unknown Category*. Mississippi assigned each category a point value for species abundance and trends. For example for measuring species: 4 points - *Species endemic to State*, 3 points – *State encompasses >25% of the species' range*, 2 points - *State encompasses 5-25% of the species' range*, and 1 point - *State encompasses < 5% of the species' range*. NatureServe (2012) divides trends into long-term and short-term and further categorized them by letter and corresponding percentage value. Further details regarding abundance and trend of SGCN are included in Appendix D.

Literature Cited:

Arizona Game and Fish Department. 2012. Arizona's State Wildlife Action Plan: 2012-2022. Arizona Game and Fish Department, Phoenix, Arizona.

Arkansas Game and Fish Commission. 2005 (Revised October 2006). The Arkansas Comprehensive Wildlife Conservation Strategy. 1647 pp. + Appendices.

BirdLife International (2004) Birds in the European Union: a status assessment. Wageningen, The Netherlands: BirdLife International. 59 pp.

Ecoregional Assessment and Biodiversity Vision Toolbox. October 2006. Standard 9. Accessed 2013. http://conserveonline.org/workspaces/cbdgateway/era/standards/std_9

Florida Fish and Wildlife Conservation Commission. 2005. Florida's Wildlife Legacy Initiative. Florida's Comprehensive Wildlife Conservation Strategy. Tallahassee, Florida, USA. 540 pp.

Master, L. L., D. Faber-Langendoen, R. Bittman, G. A. Hammerson, B. Heidel, L. Ramsay, K. Snow, A. Teucher, and A. Tomaino. 2012. NatureServe Conservation Status Assessments: Factors for Evaluating Species and Ecosystem Risk. NatureServe, Arlington, Virginia.

Mississippi Museum of Natural Science. 2005. Mississippi's Comprehensive Wildlife Conservation Strategy. Mississippi Department of Wildlife, Fisheries and Parks, Mississippi Museum of Natural Science, Jackson, Mississippi. 428 pp.

Habitat Conditions for SGCN

EPA (2012) used a letter scoring system (A-D) of assessment of wetland ecosystem condition. For example an *A* category would correspond with highest quality habitat - the landscape context contains largely natural habitats that are minimally fragmented with few stressors; the size is large or above the minimum dynamic area, the vegetation structure and composition, soils, and hydrology are functioning within natural ranges of variation; invasives and exotics (non-natives) are present in only minor amounts, or have or minor negative impact; and many key plant and animal indicators are present. When evaluating terrestrial habitat, the Arkansas WAP (2006) used the categories *poor level*, *fair level*, *good level*, and *very good level* and weighted a range of measurements to assess the relative health of associated key factors, which in turn reflect the integrity of the associated habitat. Georgia WAP (2005) acknowledged that data on abundance and condition of habitats are not sufficient to assign quantitative scores or values for most habitat types. Further details regarding assessing habitat condition of SGCN are included in Appendix E.

Literature Cited:

Arkansas Game and Fish Commission. 2005 (Revised October 2006). The Arkansas Comprehensive Wildlife Conservation Strategy. 1647 pp. + Appendices.

Ecoregional Assessment and Biodiversity Vision Toolbox. October 2006. Standard 9. Accessed 2013. http://conserveonline.org/workspaces/cbdgateway/era/standards/std_9

Faber-Langendoen, D., C. Hedge, M. Kost, S. Thomas, L. Smart, R. Smyth, J. Drake, and S. Menard. 2012a. *Assessment of wetland ecosystem condition across landscape regions: A multi-metric approach. Part A. Ecological Integrity Assessment overview and field study in Michigan and Indiana.* EPA/600/R-12/021a. U.S. Environmental Protection Agency Office of Research and Development, Washington, DC.

Florida Fish and Wildlife Conservation Commission. 2005. Florida's Wildlife Legacy Initiative. Florida's Comprehensive Wildlife Conservation Strategy. Tallahassee, Florida, USA. 540 pp.

Georgia Department of Natural Resources Wildlife Resources Division. August 2005. A Comprehensive Wildlife Conservation Strategy for Georgia. 202 pp.+ Appendices.

Master, L. L., D. Faber-Langendoen, R. Bittman, G. A. Hammerson, B. Heidel, L. Ramsay, K. Snow, A. Teucher, and A. Tomaino. 2012. NatureServe Conservation Status Assessments: Factors for Evaluating Species and Ecosystem Risk. NatureServe, Arlington, Virginia.

Sample, David W., and Michael J. Mossman. 1997. Managing habitat for grassland birds - a guide for Wisconsin. Wisconsin Department of Natural Resources, Madison, WI, PUBL-SS-925-97. 154 pp. Jamestown, ND: Northern Prairie Wildlife Research Center Online.
http://www.npwrc.usgs.gov/resource/birds/wiscbird/index.htm

APPENDIX B: SURVEY QUESTIONS AND RESULTS

Q1 Has your agency started the 2015 revision of your state's Wildlife Action Plan?

Answered: 15 Skipped: 0

Answer Choices	Responses	
Yes	**80%**	12
No	**20%**	3
Total Respondents: 15		

Q2 Please indicate which state, jurisdiction, or organization this survey represents.

Answered: 13 Skipped: 2

Answer Choices	Responses	
Maine	**7.69%**	1
New Hampshire	**7.69%**	1
Vermont	**7.69%**	1
Massachusetts	**15.38%**	2
Rhode Island	**7.69%**	1
Connecticut	**7.69%**	1
New York	**0%**	0
New Jersey	**7.69%**	1
Pennsylvania	**23.08%**	3
Delaware	**7.69%**	1
Maryland	**0%**	0
West Virginia	**0%**	0
Virginia	**7.69%**	1
District of Columbia	**0%**	0
Other	**0%**	0
Total		**13**

#	Name/Organization	Date
1	Maine Dept. of Inland Fisheries and Wildlife	3/12/2013 10:38 AM
2	CT kt	3/10/2013 9:30 AM
3	RI kt	3/10/2013 9:15 AM
4	Pennsylvania Game Commission (birds and mammals only)	3/8/2013 6:33 PM
5	Fish and Game	3/8/2013 5:07 PM
6	Delaware Division of Fish and Wildlife	3/8/2013 2:18 PM
7	Game Commission	3/8/2013 11:54 AM
8	Vermont Fish & Wildlife Department	3/7/2013 3:38 PM
9	Div. of Fish and Wildlife -- Endangered and Nongame Species Program	3/7/2013 12:43 PM
10	Division of Fisheries and Wildlife	3/6/2013 7:43 AM

Q3 Is your agency planning to use any of the systems below to justify your Species of Greatest Conservation Need (SGCN) list? Check all that apply.

Answered: 14 Skipped: 1

Answer Choices	Responses	
Federal T & E	**92.86%**	13
State T & E	**100%**	14
Federal Heritage rank	**71.43%**	10
State Heritage rank	**85.71%**	12
IUCN	**42.86%**	6
BCRs	**50%**	7
Total Respondents: 14		

#	Other (please specify)	Date
1	1. State-listed "Species of Special Concern" & 2. High regional responsibility (NEPARC, regional declines among fish & BBS routes, etc.)	3/12/2013 10:45 AM
2	NEPARC, RSGCN etc	3/10/2013 9:31 AM
3	NEPARC, RSGCN etc	3/10/2013 9:15 AM
4	Northeast regional priority	3/8/2013 6:36 PM
5	Northeast Taxonomic Matrix Hockey Stick	3/8/2013 5:08 PM
6	AFS, NMFS, NEWDTC	3/8/2013 2:23 PM
7	other recognized regional and/or national taxonomic group plans	3/7/2013 12:59 PM
8	We are developing a decision model with Cornell based on the above, plus others	3/5/2013 2:44 PM

Q4 Information is often available to assess the distributions of species, even though it may vary widely in quality. With the exception of a certain groups, such as birds, there are little or no hard data about trends in abundance that could be used to select SGCN. What is your opinion about including in our common lexicon some qualitative terms to describe trends in abundance (check all that apply)?

Answered: 14 Skipped: 1

	Strongly agree	Agree	Disagree	Strongly disagree	Total Respondent
We recommend NatureServe's population/status ranking terminology	**30.77%** 4	**38.46%** 5	**30.77%** 4	**0%** 0	13
Birds are the only group with legitimate abundance trend data	**0%** 0	**28.57%** 4	**71.43%** 10	**0%** 0	14
Birds are a good model of a lexicon for abundance	**0%** 0	**61.54%** 8	**38.46%** 5	**0%** 0	13
For all SGCN we should assign "stable, increasing, unknown"	**15.38%** 2	**69.23%** 9	**7.69%** 1	**7.69** 1	13
For every population we should assign "stable, unknown"	**0%** 0	**38.46%** 5	**38.46%** 5	**23.08** 3	13
Qualitative terms should NOT be used to describe abundance	**7.69%** 1	**15.38%** 2	**61.54%** 8	**15.38** 2	13
Our common lexicon should NOT address abundance	**7.69%** 1	**7.69%** 1	**61.54%** 8	**23.08%** 3	13

#	Comment	Date
1	Even qualitative data can be useful when attempting to prioritize (generally inevitable!) an array of topics	3/12/2013 10:45 AM
2	we may not have enough data for populations or quantitative vs. qualitative	3/10/2013 9:15 AM
3	There are many ways to measure and state bird abundance	3/8/2013 6:36 PM
4	Assigning current status in a common lexicon would be appropriate but determining trends may become problematic particularly when trend data is often lacking or with such great uncertainty that it is unreliable.	3/8/2013 2:23 PM
5	birds are not under PFBC jurisdiction; defer to PGC. For population, it is often not known. If abundance is known, why not use it in the lexicon?	3/7/2013 4:56 PM
6	Our common lexicon should make it possible to say that we don't always know "the" answer. For a regional assessment we need information	3/7/2013 3:50 PM
7	For non-T&E species, it is rare for us to have enough detail to discuss population. Although we don't like to admit it, we use Qualitative measures constantly to justify actions. No reason not to include them within the SWAP.	3/7/2013 3:07 PM
8	There will be some difficulty in assigning status, but we should try to agree on an approach. For "populations"' there will be issues of addressing what comprises a "population." Will we need to understand population status to assign status to species?	3/7/2013 12:59 PM

Q5 Species distributions may be described using many different spatial units. Check all that apply to our common lexicon.

Answered: 13 Skipped: 2

Answer Choices	Responses	
State, county, or town boundary	**84.62%**	11
Management or planning districts	**46.15%**	6
Watersheds	**76.92%**	10
Habitat patches	**69.23%**	9
Population points	**38.46%**	5
Total Respondents: 13		

#	Other (please specify)	Date
1	Ecoregions would be our top choice for terrestrial species. Perhaps political units (state / county / township) could be summarized in tabular for geographic clarity but should not be the primary spatial units.	3/12/2013 10:58 AM
2	don't have enough data on the last 2	3/10/2013 9:33 AM
3	will be data driven	3/10/2013 9:18 AM
4	Unsure of the definition of a "population point".	3/7/2013 5:17 PM
5	Biophysical regions, eco-regions	3/7/2013 4:04 PM
6	We need geospatial units that are fine enough to be descriptive and coarse enough to buffer points and allow us to compensate for localized changes that are problematic with point locations. We don't want to redraw the map every two weeks. Our habitat patches can change too rapidly.	3/7/2013 3:15 PM
7	not exactly sure what is meant by "population points"	3/7/2013 1:14 PM
8	Poorly written question	3/5/2013 2:47 PM
9	Ecoregion	3/5/2013 11:39 AM

Q6 Each SWAP is supposed to consider the distribution and abundance of all "major groups" of species (taxonomic groups or guilds) when selecting SGCN. Such data are tracked for some species by Natural Heritage programs, but in many cases, SGCN are not tracked by any formal program. For our common lexicon, which terms do we need to define in order to describe the data that are available for SGCN distribution?

Answered: 13 Skipped: 2

Answer Choices	Responses	
We do NOT need to describe distribution data	**0%**	0
Data source	**76.92%**	10
Scale	**76.92%**	10
Resolution	**76.92%**	10
Precision	**61.54%**	8
Age	**76.92%**	10
Quality	**76.92%**	10
Type	**76.92%**	10
Contact	**69.23%**	9
Link	**46.15%**	6
Sensitivity	**84.62%**	11
Total Respondents: 13		

#	Other (please specify)	Date
1	We generally screen out imprecise occurrences = not a factor if that is generally true? Species with data sensitivity issues merit some general discussion.	3/12/2013 10:58 AM
2	is link connectivity or web link?	3/10/2013 9:18 AM
3	Does "age"=date of a record? What is "link"? Does "quality" refer quality of location or species identification? A "confidence" field is needed.	3/7/2013 4:04 PM
4	I checked everything, but I am not sure what this question is asking. Do we need to define these terms or are we determining if these are fields that need to be included in some metadata structure? Or am I misunderstanding? The system won't let me leave this blank.	3/7/2013 3:15 PM
5	While it would be ideal to have this information for species not "tracked" by NHP's, the degree to which we will be able to provide such information will be very inconsistent.	3/7/2013 1:14 PM
6	Huh?	3/5/2013 2:47 PM

Q7 Many different types of data are available to represent distributions of SGCN. Please select all that you believe should be described in our common lexicon.

Answered: 13 Skipped: 2

Answer Choices	Responses	
Element Occurrence	**92.31%**	12
Source Feature	**69.23%**	9
Presence/absence points	**61.54%**	8
Habitat classes	**76.92%**	10
Habitat patches	**69.23%**	9
Habitat suitability model	**30.77%**	4
Niche model	**7.69%**	1
Habitat capability model	**23.08%**	3
Buffer	**30.77%**	4
Total Respondents: 13		

#	Other (please specify)	Date
1	Migration / connectivity corridors are sometimes a key data type. Observation points can be tracked in our "faunal heritage database" to promote evaluations of species status, but we usually subset a more refined type of data for flagging via environmental review or triggering management activity. Modeling is generally not an acceptable alternative.	3/12/2013 10:58 AM
2	not sure any of the last 5 are available in many states but should be included if possible	3/10/2013 9:33 AM
3	the latter 5 are likely not to be available	3/10/2013 9:18 AM
4	Confusing. We assume "class" refers to habitat type and "patch" to the habitat where a species is found.	3/7/2013 4:04 PM
5	I checked everything but I don't understand what this question is asking me. What will it mean if I check a box? The system won't let me leave this blank.	3/7/2013 3:15 PM
6	For those that we did not agree should be described, we would agree that they cold be included if all we are doing is indicating their availability or providing a link or reference.	3/7/2013 1:14 PM

Q8 For each SGCN, we need to identify habitat associations. Do you accept a crosswalk to the Northeast Terrestrial and Aquatic Habitat Classifications as a common standard for describing SGCN habitats?

Answered: 13 Skipped: 2

Answer Choices	Responses	
Yes	**69.23%**	9
No	**0%**	0
Don't know	**30.77%**	4
Total Respondents: 13		

#	Comment required if answer is no.	Date
1	but we will use our more specific system as well	3/10/2013 9:34 AM
2	but we will use our more specific system as well	3/10/2013 9:20 AM
3	Depends upon how the crosswalks will be applied. Both classifications are great, but uncertain of the useable scale for resource managers.	3/7/2013 5:28 PM
4	VT uses natural community classification which dovetails w/ this model but natural communities is at a finer scale.	3/7/2013 4:05 PM
5	We need to determine if these classifications actually facilitate better management. Other states have abandoned similarly complex models because staff couldn't apply them. They adopted more basics systems like the National Landcover Dataset. On a separate note, we often don't know enough about our SGCN to talk intelligently about their habitat tolerances.	3/7/2013 3:19 PM
6	Caveat -- there still needs to be significant work done to QA/QC both habitat classifications and their applications (mapping) and the crosswalk. We have less concern with the classification approach than we do with the actual data layers (mapping)	3/7/2013 1:25 PM
7	Still doesn't exist for aquatic	3/5/2013 2:49 PM

Q9 The RCN program funded habitat classifications, habitat mapping, and the "Geospatial Condition Analysis", which will provide relative indices of condition for each class of habitat. The indices will be based on on available spatial data, such as conservation status, resiliency, road density, patch size, etc. The scores can be applied at any relative scale, such as the whole region or within states, answering such questions as where is the highest ranked patch of pine barrens in New Jersey? In summary, this project will define and estimate specific parameters to describe the relative condition of each habitat class, in each state, and across states. Do you agree that this approach will satisfy our needs with regard to a common lexicon for habitat condition?

Answered: 13 **Skipped: 2**

Answer Choices	Responses	
Yes	**30.77%**	4
No	**0%**	0
Don't know	**69.23%**	9
Total Respondents: 13		

#	Comment required if answer is no.	Date
1	Maine needs more info on "geospatial condition analysis" Of course, our small patches of pine barrens are inconsequential relative to those in NJ, but jurisdictions attempting to conserve species at risk near range limits can't always cope with such comparisons!	3/12/2013 11:02 AM
2	its a good start	3/10/2013 9:34 AM
3	its a good start	3/10/2013 9:20 AM
4	Unclear about the scope of this question	3/7/2013 5:28 PM
5	We are not willing to adopt these systems until we have determined their accuracy. If the habitat map does not accurately represent "on the ground" conditions, we won't use it to make important planning decisions.	3/7/2013 3:19 PM
6	It will be the only game in town across a regional scale, so yes. Would like the capability to include other more local approaches that exist now or in the future.	3/7/2013 1:25 PM

Q10 Both NEPARC and NEFWDTC have adopted an approach to select Species of Greatest Conservation Need (SGCN) using conservation need and responsibility as screening factors. In this approach, need was measured by the proportion of Northeast states identifying a species as an SGCN, and responsibility was measured by the proportion of a species distribution occurring in the Northeast. Is your agency willing to work toward developing a similar common practice to select SGCN?

Answered: 13 Skipped: 2

Answer Choices	Responses	
Yes	**69.23%**	9
No	**30.77%**	4
Total	**13**	

Q11 Above, the distribution-based "responsibility" factor is fairly objective to measure, however "conservation need" is very inconsistently defined across organizations. Which of the following terms would you be willing to accept as common descriptors of the overall "conservation need" for a species, considering the cumulative effect of all the threats that impact a species (check ALL that apply):

Answered: 13 Skipped: 2

Answer Choices	Responses	
Immediacy [needs conservation now vs. later]	**92.31%**	12
Certainty [need is nearly certain vs. uncertain]	**92.31%**	12
Extent [current impacts are sustainable vs. not sustainable]	**76.92%**	10
Reversible [impacts may be reversed vs. irreversible]	**92.31%**	12
Total Respondents: 13		

#	Other (please specify)	Date
1	Regional endemics (and especially state endemics) may not be getting sufficient priority & are often among the most vulnerable in diversity programs.	3/12/2013 11:09 AM
2	might be others	3/10/2013 9:34 AM
3	we may not be able to determine this for all species	3/10/2013 9:23 AM
4	Concepts (i.e., phrases) are good, but terminology needs to be adjusted. Example: Extent is a geographic term-use Sustainable. Response to 12: Nice try-we want to comment anyway. Categories should provide a gradient of responses	3/7/2013 5:46 PM
5	How does one apply "immediacy" if Action Plans/SWG are supposed to prevent species from becoming endangered	3/7/2013 4:08 PM
6	These terms haven't been explained well enough for me to make an informed decision about what criteria should or should not be considered. The system wouldn't let me leave them all blank, so I checked them all, instead.	3/7/2013 3:29 PM
7	If these terms or similar were used to determine conservation need as opposed to using the NEPARC approach, we would be more comfortable with our 'yes' to 10 above.	3/7/2013 1:44 PM

Q12 Please read the choices above again, and notice each term can be represented by an "either / or" type of category, such as now/later, certain/uncertain. Do you agree that using only 2 or 3 simple categories is a useful approach to achieve consistent assessments of species conservation needs across organizations?

Answered: 13 Skipped: 2

Answer Choices	Responses	
yes	**61.54%**	8
no	**46.15%**	6
Total Respondents: 13		

Q13 The questions above describe the use of several categorical factors to summarize the overall conservation need (or degree of threat) as a tool to help select SGCN. Once SGCN are selected, a similar approach could be used to go one step further and assess several categorical factors for each specific threat that is impacting "species x". Do you agree that our common lexicon should include terminology to define categorical factors to assess specific threats, species by species?

Answered: 13 Skipped: 2

Answer Choices	Responses	
yes	**84.62%**	11
no	**15.38%**	2
Total Respondents: 13		

Q14 What terms do we need to use to adequately describe key attributes of threats? Check ALL that apply.

Answered: 13 Skipped: 2

Answer Choices	Responses	
Human factors	**69.23%**	9
Environmental factors	**76.92%**	10
Biological stress	**61.54%**	8
Scale	**84.62%**	11
Extent	**84.62%**	11
Immediacy	**92.31%**	12
Reversibility	**92.31%**	12
Total Respondents: 13		

#	Other (please specify)	Date
1	Duration (acute / chronic). Even scale, extent & reversibility may be useful attributes but not if this planning is not dynamic or feedback via adaptive management is constrained.	3/12/2013 11:09 AM
2	there might be others but not enough time to do here	3/10/2013 9:23 AM
3	Couldn't Biological Stress be an attribute of Human or Environmental factors. Do you mean Biological Factors such as genetic or interspecific competition?	3/7/2013 5:46 PM
4	Use Salafsky et. al. Taxonomy of Direct Threats	3/7/2013 4:08 PM
5	Category, scope, severity	3/7/2013 3:29 PM
6	As a comment to this question and 13 above, we agree that the inclusion of such terminology would be useful, but we may not be in a position to apply it now or in the near future.	3/7/2013 1:44 PM

Q15 In planning, some refer to a natural resource as an "element" or a "target;" others refer to planning processes as "elements", and still others call the desired outcome of implementing planned actions "targets". Is your agency willing to work toward a series of common terms (such as resource, goal, objective, desired outcome, indicator, level) that can be used to connect natural resources to actions and measurable outcomes, so that performance can be tracked logically as progress toward specific results that contribute to larger goals?

Answered: 13 Skipped: 2

Answer Choices	Responses	
Yes	**84.62%**	11
No	**15.38%**	2
Total	**13**	

Q16 Tell us what you think of the following as sequence of terms to link resources to actions to results: Resource; Goal; Objective; Desired outcome; Indicator; Level. Is each term as useful part of the sequence as a whole?

Answered: 13 Skipped: 2

	Useful	Not useful	I do not understand this term	Total
Resource	**61.54%** 8	**0%** 0	**38.46%** 5	13
Goal	**92.31%** 12	**0%** 0	**7.69%** 1	13
Objective	**92.31%** 12	**0%** 0	**7.69%** 1	13
Desired outcome	**100%** 13	**0%** 0	**0%** 0	13
Indicator	**92.31%** 12	**0%** 0	**7.69%** 1	13
Level	**38.46%** 5	**15.38%** 2	**46.15%** 6	13

#	Other (please specify)	Date
1	Goal & desired outcome could be fairly similar, unless one factors more realism! "Level" is too vague without clarification.	3/12/2013 11:20 AM
2	clarify level?	3/10/2013 9:36 AM
3	not sure what level means here	3/10/2013 9:27 AM
4	Should consider defining "indicator", "resource" & "resource". What about "measures" as in "performance measures" that we are required to use as part of Wildlife TRACS.	3/7/2013 6:09 PM
5	Strategies (a way to achieve an objective) and actions (the steps to implementing a strategy)? Would that be too fine-scaled?	3/7/2013 4:12 PM
6	these terms will be useful as the definitions we apply to them and the clarity/distinctions among them.	3/7/2013 2:37 PM

Q17 Do you agree the following terms are useful to describe an adaptive management framework for actions? Check ALL that apply.

Answered: 13 Skipped: 2

	Strongly agree	Agree	Disagree	Strongly disagree	Total
Performance indicator	**23.08%** 3	**61.54%** 8	**15.38%** 2	**0%** 0	13
Start	**7.69%** 1	**61.54%** 8	**30.77%** 4	**0%** 0	13
Duration	**15.38%** 2	**61.54%** 8	**23.08%** 3	**0%** 0	13
Evaluation cycle	**23.08%** 3	**53.85%** 7	**23.08%** 3	**0%** 0	13
Data management capacity	**0%** 0	**54.55%** 6	**45.45%** 5	**0%** 0	11

#	Other (please specify)	Date
1	"Effectiveness" was cited by some staff but may overlap with performance indicator?	3/12/2013 11:20 AM
2	not sure what data capacity means	3/10/2013 9:36 AM
3	please clarify data mgmt capacity	3/10/2013 9:27 AM
4	It's difficult to agree or disagree without definition of the terms.	3/7/2013 6:09 PM
5	Such terms should align with Wildlife TRACS adaptive mgmt module (if there is one).	3/7/2013 4:12 PM
6	I don't understand the term "Data management capacity" so I clicked "Disagree"	3/7/2013 3:37 PM
7	In the context of SWAPs and the level of action detail and specificity that needs to be in SWAPs, most of these terms go "too far." They are useful for adaptive management of projects, but SWAPs are not meant to be project plans.	3/7/2013 2:37 PM

Q18 In SWAPs, actions are supposed to be linked to specificthreats. However, that relationship is not always direct or obvious. Yet, in order to prescribe the right kind of action, specific attributes of the threats addressed need to be identified. Are the following terms useful to help describe how a particular action might be related to or address certain threats? Rate each one.

Answered: 13 Skipped:

	Useful	Not useful	Total
Threat addressed by action	**84.62%** 11	**15.38%** 2	13
Human factors addressed by action	**83.33%** 10	**16.67%** 2	12
Environmental factors addressed by action	**83.33%** 10	**16.67%** 2	12
Biological stresses addressed by action	**83.33%** 10	**16.67%** 2	12
Expected direct benefits	**84.62%** 11	**15.38%** 2	13
Expected indirect benefits	**75%** 9	**25%** 3	12
Expected change in resource status	**69.23%** 9	**30.77%** 4	13

#	Other (please specify)	Date
1	All seem reasonable concepts. An implementation phase might better reveal which are more useful than others.	3/12/2013 11:20 AM
2	If we are talking about wildlife, we should really stick to wildlife rather than a calling it a resource.	3/8/2013 5:18 PM
3	Not sure what this is trying to address.	3/7/2013 6:09 PM
4	These sound good but we don't know if all are needed or if these are comprehensive.	3/7/2013 4:12 PM
5	Change in threat status/level.	3/7/2013 2:37 PM

Q19 Many organizations use the S.M.A.R.T. system to ensure that goals are developed with enough detail to make implementation possible. If you are not familiar with this concept, please google it. Do you agree that the common lexicon should use a similar model, including who, what, where, when etc. to describe actions?

Answered: 13 Skipped: 2

Answer Choices	Responses	
Yes	**84.62%**	11
No	**15.38%**	2
Total Respondents: 13		

Q20 Do you agree it is valuable to have a common way to describe the feasibility and efficacy of proposed conservation actions?

Answered: 13 Skipped: 2

Answer Choices	Responses	
yes	**84.62%**	11
no	**15.38%**	2
Total	**13**	

Q21 Is your agency willing to work toward a common approach to prioritizing actions, where factors such as the urgency of the threat addressed are considered in conjunction with the feasibility, cost and efficacy of the proposed action?

Answered: 13 Skipped: 2

Answer Choices	Responses	
Yes	**76.92%**	10
No	**23.08%**	3
Total	**13**	

Q22 Do you agree the following terms are useful to categorize actions for prioritization? Check ALL that apply.

Answered: 13 Skipped: 2

	Stongly agree	Agree	Disagree	Strongly disagree	Total
Expected effectiveness	**30.77%** 4	**61.54%** 8	**7.69%** 1	**0%** 0	13
Cost estimate	**7.69%** 1	**76.92%** 10	**15.38%** 2	**0%** 0	13
Funding availability	**7.69%** 1	**61.54%** 8	**30.77%** 4	**0%** 0	13
Implementer availability	**0%** 0	**69.23%** 9	**30.77%** 4	**0%** 0	13
Start date	**7.69%** 1	**46.15%** 6	**46.15%** 6	**0%** 0	13

Q23 Species distributions, habitat conditions, threats and actions may all be related spatially. The "eight required elements" for SWAPs refer to spatially explicit actions. For example, an action or threat could apply to one, many, or all patches of a habitat type, or only those in a certain town. Which spatial units do we need to accommodate in our lexicon in order to describe the location actions are intended to be implemented? Check all that apply, recognizing that some may be used in combination.

Answered: 13 Skipped: 2

Answer Choices	Responses	
State, county, or town boundary	**92.31%**	12
Management or planning districts or conservation zones	**61.54%**	8
Watersheds	**61.54%**	8
Habitat classes	**46.15%**	6
Habitat patches	**53.85%**	7
Population points	**30.77%**	4
Total Respondents: 13		

#	Other (please specify)	Date
1	Ecoregions for terrestrial species & watersheds for aquatic/ riparian species seem preferable as overall spatial units. Political units or management / planning / conservation districts are secondary-scale units at best.	3/12/2013 11:20 AM
2	last 2 if possible but likely not to have enough data	3/10/2013 9:36 AM
3	don't think we'll have the last 2 for many species or habitats	3/10/2013 9:27 AM
4	Implementation happens at a finer scale (e.g., site) which is not represented by these categories. For Questions 19-21: seem bias to obtain a "yes".	3/7/2013 6:09 PM
5	ecoregions	3/5/2013 12:01 PM

Q24 Identifying data gaps and uncertainties is a requirement throughout SWAPs, for the purpose of framing the adaptive management process. Is your agency willing to adopt some common ways to describe uncertainties, so they can be consistently addressed by monitoring, performance tracking, and/or research in an adaptive management context?

Answered: 12 Skipped: 3

Answer Choices	Responses	
Yes	**91.67%**	11
No	**8.33%**	1
Total	**12**	

Q25 Identifying data gaps and uncertainties applies to multiple SWAP elements: species/habitat distribution, status, and condition, and also threats and actions. Therefore, our common lexicon needs to accommodate a means to identify uncertainties and corresponding monitoring or research for each SWAP element. Are the following terms sufficient to describe different general TYPES of uncertainty that might be identified across all SWAP elements, even though some of the suggested types may not apply to all SWAP elements?

Answered: 12 Skipped: 3

	Agree	Disagree	Don't know	Total
Uncertainty of Causality	**75%** 9	**0%** 0	**25%** 3	12
Uncertainty of Effectiveness	**83.33%** 10	**0%** 0	**16.67%** 2	12
Uncertainty of Status	**83.33%** 10	**8.33%** 1	**8.33%** 1	12
Uncertainty of Measurment	**58.33%** 7	**8.33%** 1	**33.33%** 4	12
Information Gap	**81.82%** 9	**9.09%** 1	**9.09%** 1	11

#	Other (please specify)	Date
1	A variety of limiting factors could be influential over time & space: presumably these could overlap with "uncertainty of causality" and "information gap" but they are not a clear fit within the above matrix.	3/12/2013 11:35 AM
2	These need to be defined.	3/7/2013 6:21 PM
3	Information gap seems like a driver of 1-4	3/5/2013 12:05 PM

Q26 Which general categories of monitoring and research does the lexicon need to accommodate? Check all that apply.

Answered: 12 Skipped: 3

	yes	no	Total
It is not necessary for the lexicon to categorize monitoring and research actions	**18.18%** 2	**81.82%** 9	11
Threat Detection	**72.73%** 8	**27.27%** 3	11
Change in Threat Status	**81.82%** 9	**18.18%** 2	11
Presence/Absence Surveys for SGCN Distribution	**100%** 11	**0%** 0	11
Relative Abundance/Density	**90.91%** 10	**9.09%** 1	11
Reproduction/Demography	**90.91%** 10	**9.09%** 1	11
Detect Habitat Change	**90.91%** 10	**9.09%** 1	11
Survey Habitat Quality	**90.91%** 10	**9.09%** 1	11
Genetics	**90.91%** 10	**9.09%** 1	11
Detect Contaminants/Pollution/Air & Water Quality	**81.82%** 9	**18.18%** 2	11

#	Please list others.	Date
1	Most of these could be a need given the array of taxa under consideration, but they should be not addressed routinely for all SGCN species in the Northeast. Is this necessary or useful in regional coordination, or is it implicit that some flexibility is needed here amongst participants? For instance, "relative abundance / density" & "survey habitat quality" might sufficient in core range within the region, but other categories could be crucial at periphery of range. I can see some standardization for basic presence / absence surveys on SGCN species, but other topics are uncertain in general.	3/12/2013 11:35 AM
2	last one is one threat	3/10/2013 9:37 AM
3	the last one is a specific threat so why separate it out	3/10/2013 9:29 AM
4	determine the habitat requirements of a species; determine life history of a species; identify locations of habitat	3/7/2013 4:17 PM
5	Threat detection should include threat characterization. Not sure which of these would cover/include disease monitoring.	3/7/2013 2:57 PM
6	gack	3/5/2013 3:05 PM

Q27 Does TRACS provide sufficient guidance toward a SWAP lexicon for tracking the performance of implemented SWAP actions?

Answered: 12 Skipped: 3

Answer Choices	Responses	
Yes	**16.67%**	2
No	**8.33%**	1
Don't know	**75%**	9
Total	**12**	

Q28 In addition to the TYPES of uncertainty described above, do you agree the following terms are useful to DESCRIBE the significance of a particular area of uncertainty?

Answered: 12 Skipped: 3

	Agree	Disagree	Don't know	Total
Categorize Level of Uncertainty	**66.67%** 8	**0%** 0	**33.33%** 4	12
Categorize Feasibility of Reducing Uncertainty	**25%** 3	**8.33%** 1	**66.67%** 8	12
Categorize Risk of Consequence	**41.67%** 5	**8.33%** 1	**50%** 6	12

#	Other (please specify)	Date
1	Need clarification to comment. What's the "risk of consequence of uncertainty"? Are we relying on worst-case scenarios or other forecast projections?	3/12/2013 11:35 AM
2	We need more info before we can answer uncertainty questions	3/7/2013 4:17 PM
3	I'm uncertain	3/5/2013 12:05 PM

Q29 Are you willing to adopt a common standard for documenting the literature cited in SWAPs?

Answered: 12 Skipped: 3

Answer Choices	Responses	
Yes	**91.67%**	11
No	**8.33%**	1
Total	**12**	

#	Suggested citation standard	Date
1	Journal of Wildlife Management	3/8/2013 6:41 PM

Q30 Is your agency willing to adopt a standard method to document search terms, keywords, and other metadata to describe sources of information for the Northeast?

Answered: 12 Skipped: 3

Answer Choices	Responses	
Yes	**91.67%**	11
No	**8.33%**	1
Total	**12**	

APPENDIX C: EXAMPLES OF COMMITTEE CHARTER AND OUTREACH STRATEGY

Example Committee Charter

Pennsylvania Wildlife Action Plan
Revising the PA WAP (2015)

Advisory Committee: Roles and Responsibilities

Background: In September 2005, the Pennsylvania Game Commission (PGC) and Pennsylvania Fish & Boat Commission (PFBC) submitted the first Pennsylvania Wildlife Action Plan (PA WAP). With a Wildlife Action Plan submitted by each state and U.S. Territories, this congressionally mandated document maintained the eligibility of Pennsylvania for receipt of State Wildlife Grant (SWG) funding. After rigorous regional and national review, the U.S. Fish & Wildlife Service (FWS) approved the Pennsylvania WAP in 2006.

To maintain eligibility for ongoing SWG funds, Congress also required regular updates of the WAP by each state/territory, at an interval not to exceed 10 years. The next version of the PA WAP is due to the FWS no later than 30 September, 2015. Considering the extensive volume and scope of this document, the PGC and PFBC have initiated the process for revising the PA WAP.

As part of this revision process, the PGC and PFBC are requesting advice and recommendations from partners who were involved in the development of the first PA WAP or who may have a critical role in the implementation of the current plan or the revised plan (PA WAP 2015). In addition, consultation with federal, state and tribal agencies, as well as partners and the public, are required as part of the Wildlife Action Plan revision process (Elements 7 & 8). Therefore, this Advisory Committee (hereafter Committee) can further assist in addressing this requirement.

For efficiency and effectiveness, we have identified the following Roles and Responsibilities as well as Operational Guidance for participants of this Committee. We are genuinely seeking your candid and constructive advice in the revision of the PA WAP.

Roles & Responsibilities

1. **Advisory:**
    a. This committee will function in an advisory role only.
    b. PGC and PFBC reserve the right to use, modify or to limit use of any recommendations or materials provided by the Committee.

2. **Participation**:
    a. Participation in the Committee is voluntary and members should not feel obligated to participate.

b. To maintain a manageable committee size, participation is by invitation.
    i. Additional members may be recommended, but their participation must be approved by both PFBC and PGC.
    ii. Committee members may consult with other partners who may not be part of the Committee to gather pertinent information.
c. PGC and PFBC recognize that participants have obligations to their agency or organization. We will strive to minimize the time and inconvenience of participants.
d. Participation in this committee will not provide any advantage in securing current or future funding from State Wildlife Grants or other sources, provided by either the PGC or PFBC.
e. Participants will provide all professional courtesy to other members (see details in Operational Guidance below).

3. **Meetings:** The PGC and PFBC recognize that increasing travel expenses are impinging upon the budgets of state, federal and non-governmental organizations. Therefore:
    a. In-person meetings will be kept to a minimum (estimated 2 per year).
    b. Conferencing and web-ex will be used to foster communication between in-person meetings.
    c. If technical teams/sub-committees are formed, the leaders of these groups will be responsible for coordinating technical team meetings and conference calls. PFBC and PGC will assist in facilitating these meetings/calls.

4. **Travel Expenses:**
    a. Participants will be responsible for their own travel expenses, unless funding is available to offset travel costs.

5. **Tasks:**
    a. Committee participants may be asked to develop new materials, provide existing materials, gather information or other necessary tasks, to assist with the revision process.
    b. Copyrighted or restricted material must be acknowledged and thoroughly referenced.
    c. Due dates for tasks will be developed through mutual consent by the participants.

6. **Acknowledgement:**
    a. The conservation and protection of Pennsylvania's natural resources is a collaborative effort. PGC and PFBC are truly appreciative of the efforts and support from partners.
    b. All participants will be gratefully acknowledged in the revised PA WAP.

Operational Guidance

Overview: This is a statewide effort with national significance and we recognize that participating members of this Committee will represent the interests of their respective agencies and organizations. We also respect that this project is *in addition to* each member's standard duties and responsibilities. The following operational guidance provides a foundation for the responsibilities of participants to ensure timely completion of the revised Wildlife Action Plan.

Collegiality: This project has a common goal (i.e., a completed, revised plan) and provides an opportunity to build camaraderie.

- Have fun!
- Make new acquaintances and build upon existing relationships.
- Share your knowledge and learn from others.

Timelines: Established timelines are to ensure timely completion of the project.

- Please abide by timelines for meetings, draft documents; conference calls, and related activities
- When participating (e.g., verbal or written ideas), please be mindful of time constraints. If a topic requires further discussion, propose an alternative venue.

Mutual Respect & Trust: A strength of this Committee is the diverse knowledge and experience of its members. Committee products will be based upon our collective contributions. Scientific discourse can be productive (and occasionally messy), so keep in mind the following guidance for participation:

- Respect all contributions & ideas.
- Critiques should be directed at the ideas not the person. The tone of such critiques should be constructive and not degrading, condescending, or inflammatory.
- Minimize non-subject discussions. Keep to the topic, unless absolutely necessary.
- Be considerate of distractions and avoid speaking while others are speaking -- wait until you are called upon or there is an appropriate time for providing your comment.
- Minimize "side bar" conversations.
- Encourage participation by all members.
- Avoid hidden agendas. Be open about potential conflicts of interests.
- Place cell phones on "manner mode" and if receiving a call, minimize disruption to the group.

Shared Roles & Responsibilities: The complexity and requirements of this project require shared roles and responsibilities. Participants will strive to share the tasks and responsibilities by:

- Volunteering for tasks, especially those for which they have special expertise or interests.
- Being proactive in providing information that can assist with filling data gaps and advancing ideas.
- Being responsible for keeping current on the status of the project, even if they are unable to participate in all meetings, conference calls, or similar discussions.

Decision-Making: It is unlikely we will all fully agree on all aspects of the various products. Further, as Advisory Committee members, information provided represents *recommendations* to the Commissions. The PGC and PFBC are responsible for the final Wildlife Action Plan. Therefore, the following guidance is provided for decision-making:

- Members present during specific meetings or conference calls are encouraged to participate fully in the decision-making process.
- Adapt a "will live with" decision-making format.
- Given the short project timelines, not all members will be present at each meeting or conference call. As decisions are made or conclusions reached, those not in attendance agree to move forward as a team and not retrace discussions or decisions causing unnecessary back-tracks for the team as a whole.
- Be open-minded and creative. As differences in viewpoints arise, strive to actively listen to the other person's views and rationale.

- Decisions not receiving "will live with" support will be provided to the PFBC and PGC for resolution. Explanations will be provided for any final decision.

Example Public Input Plan

This plan identifies three types of stakeholders and sets general and specific communication goals for each.

	Audiences Targeted				**#**
Type of Promotion	**Tier 1 Stakeholders- TWW, DNR, Fed/sate partners Collaborators Goal: Consult and collaborate**	**Tier 2 Stakeholders- Interested but limited investment Goal: Inform and involve**	**Tier 3 General Public Goal- Inform**	**Target Date**	
Direct Mail/email Fact sheets/ program material	Email, (record dates)	Email, (record dates)		Quarterly (Same as website- see below)	
Direct mail/email Brochures/Flyers	Email, (record dates)	Email, (record dates)		Initial mailing , then distribute at meetings & presentations throughout 04-05	
Website- Updated quarterly Phase 1- Introductory material Phase 2- GCN species/habitat info Phase 3- Conservation Actions, Threats Phase 4- Conservation Actions Draft Phase 5- Draft Plan update Phase 6- final plan announcement	maps and threats to help ID Conservation Actions	X	X	**Apri**l- Intro materials **July-** GCN info and solicit **October** Conservation actions - solicit input **Jan 05**- C Actions draft **April- June 05** Draft plan **September 05-** Final Plan	
Planning Committee meetings DNR/agency internal memos- Inreach TWW meetings/correspondence	X			Meeting- Every month monthly updates monthly emails minimum	
Newsletters- put in org newsletters	X	X		Quarterly to every 6 months	
Magazine articles- DNR or state conservation organizations	X	X	X	Quarterly to every 6 months	
Public relations: press releases	Quarterly X	X	X	Quarterly with website updates	
Workshop	June- GCN January- Conservation Actions X	X	X	2 for Tier 1 ,possible invite to Tier 2	
Exhibit /poster at Meetings	X	X		Every Possible state meeting; set up traveling exhibit	
DNR staff and TWW staff briefing/report at all meetings possible	Distribute brochures, and updates	Distribute brochures, and updates	Distribute brochures, and updates	All meetings possible Develop schedule and list	
Presentations to Tier 2 and 3 groups				As requested	

This page intentionally left blank

Attachment II: Landscape Project Report, v 3.3

New Jersey Landscape Project Version 3.3

Wildlife habitat mapping for community land-use planning and species conservation

Conserve Wildlife

New Jersey Department of Environmental Protection, Division of Fish & Wildlife, Endangered & Nongame Species Program

STATE OF NEW JERSEY

Chris Christie, Governor
Kim Guadagno, Lieutenant Governor

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

Bob Martin, Commissioner
David Glass, Deputy Commissioner

OFFICE OF NATURAL AND HISTORIC RESOURCES

Richard Boornazian, Assistant Commissioner

DIVISION OF FISH AND WILDLIFE

Larry Herrighty, Director

Endangered and Nongame Species Program

Dave Jenkins, Bureau Chief

Jeanette Bowers-Altman, Principal Zoologist
Kathleen Clark, Supervising Zoologist
Christina Davis, Senior Environmental Specialist
Amanda Dey, Principal Biologist
Gretchen Fowles, Geographic Information Systems Specialist
MacKenzie Hall, Environmental Specialist
John Heilferty, Environmental Specialist
Brian Henderson, Geographic Information Systems Specialist
Sharon Petzinger, Senior Zoologist
William Pitts, Wildlife Technician
Kris Schantz, Principal Zoologist
Robert Somes, Senior Zoologist
Patrick Woerner, Geographic Information Systems Specialist
Brian Zarate, Senior Zoologist

ENDANGERED AND NONGAME SPECIES ADVISORY COMMITTEE

Barbara J. Brummer, Ph.D., Chair
James E. Applegate, Ph.D.
Joanna Burger, Ph.D.
Emile DeVito, Ph.D.
Jane Morton Galetto
Howard Geduldig
Richard Lathrop, Ph.D.
Erica Miller, D.V.M.
David Mizrahi, Ph.D.
Howard K. Reinert, Ph.D.
James A. Shissias

New Jersey Landscape Project

VERSION 3.3

WILDLIFE HABITAT MAPPING FOR COMMUNITY LAND-USE PLANNING AND SPECIES CONSERVATION

New Jersey Department of Environmental Protection
Division of Fish and Wildlife
Endangered and Nongame Species Program

NEW JERSEY DIVISION OF
Fish and Wildlife

ACKNOWLEDGEMENTS

Since its inception, the Landscape Project has been a collaborative effort that has relied on the collective knowledge and labor of the entire staff at the Division of Fish and Wildlife's Endangered and Nongame Species Program (ENSP). ENSP is indebted to former staff members who played a role in laying the foundation upon which the project has developed, including Pete Winkler, Mick Valent, Dave Golden, Patrick Meola, Jim Myers, former Bureau Chief Larry Niles, Steve Paturzo, Jim Sciascia, Eric Stiles, Jeff Tash, Jason Tesauro, and Melissa Woerner.

Special thanks are due to Mike Davenport who played a critical role in incorporating marine species into the Landscape Project.

Finally, a special thanks to those who contributed to various sections of this report: Tim Dunne, USDA Natural Resources Conservation Service; Gail Kenny, NJDEP Natural and Historic Resources; John Thomas, NJDEP Green Acres Program; Larry Torok, NJDEP Division of Land Use Regulation; Eric Schrading, U.S. Fish and Wildlife Service; and staff from the Endangered and Nongame Species Program.

The Landscape Project has been supported by:
United States Fish and Wildlife Service
Federal Aid in Wildlife Restoration Act (Pittman-Robertson Act)
Partnerships for Wildlife Act
State Wildlife Grants
NJ Department of Environmental Protection
National Fish and Wildlife Foundation
Geraldine R. Dodge Foundation
Conserve Wildlife Foundation of New Jersey

The citizens of New Jersey, who have purchased the Conserve Wildlife License Plate, checked-off for wildlife on their state income tax return or made a direct donation to the Division of Fish and Wildlife's (DFW) Endangered and Nongame Species Program (ENSP) or the Conserve Wildlife Foundation of New Jersey.

The general methods described in this document have been peer reviewed by: John F. Bunnell, Pinelands Commission; Dr. Joanna Burger, Rutgers University; Dr. William Cromartie, The Richard Stockton College of New Jersey; Dr. Michael Gochfeld, Rutgers University; Dr. John Hasse, Rowan University; Dr. Daniel Hernandez, The Richard Stockton College of New Jersey; Dr. Eric Karlin, Ramapo College of New Jersey; Dr. Richard Lathrop, Rutgers University; Dr. Howard Reinert, The College of New Jersey; Dr. Lance S. Risley, William Paterson University; and Dr. David Tulloch, Rutgers University.

Report layout design based on Massachusetts' *BioMap2* Summary Report.

Report prepared by: Patrick Woerner, Brian Henderson, Peter Winkler, William Pitts, and Melanie Mason.

Suggested Reference: New Jersey Division of Fish and Wildlife. 2017. New Jersey Landscape Project, Version 3.3. New Jersey Department of Environmental Protection, Division of Fish and Wildlife, Endangered and Nongame Species Program. pp. 33.

TABLE OF CONTENTS

ACKNOWLEDGEMENTS 2

CHAPTER 1. A Tool for Strategic Wildlife Habitat Conservation 4

CHAPTER 2. New Jersey's Diverse Landscapes 13

CHAPTER 3. A Method for Delineating Imperiled and Special Concern Wildlife Habitat 17

DATA AVAILABILITY 26

LITERATURE CITED 27

GIS DATA SOURCES 28

GLOSSARY AND CONVERSIONS 29

PHOTO AND MAP CREDITS 33

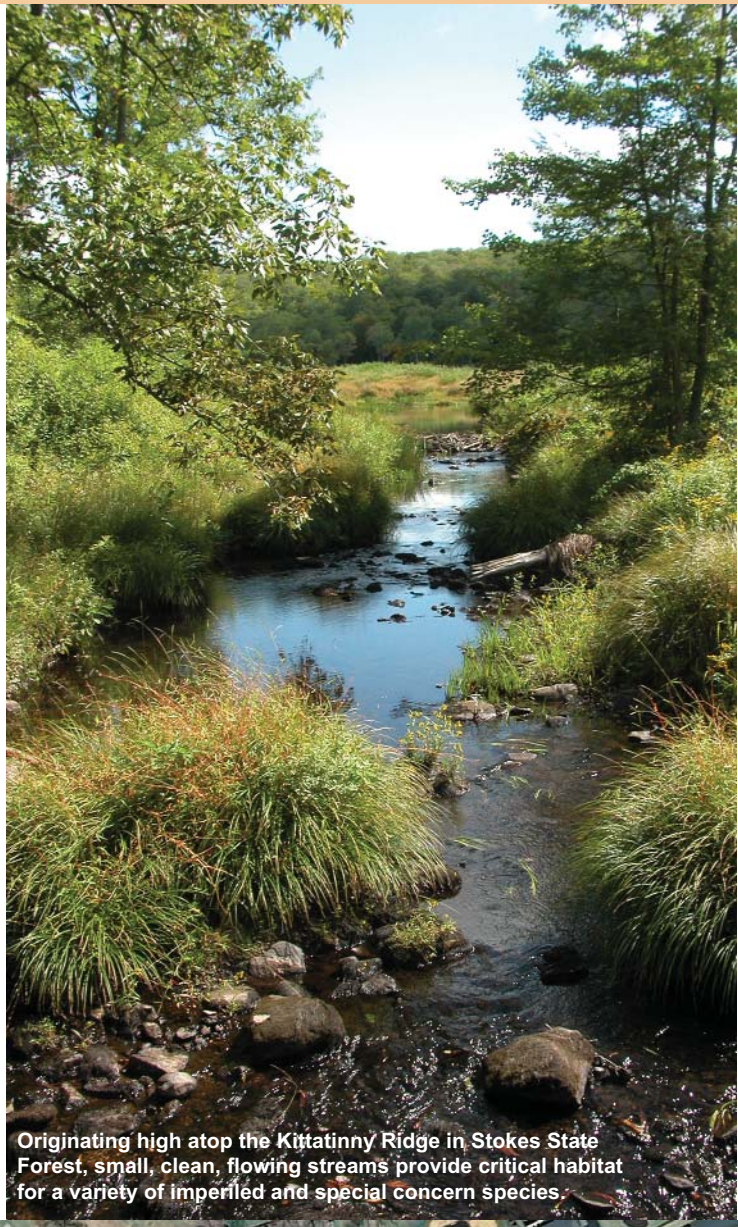
APPENDICES (AVAILABLE ONLINE) 33

CHAPTER 1

A Tool for Strategic Wildlife Habitat Conservation

Although New Jersey is one of the smallest states in the nation, it is home to a diverse assemblage of natural landscapes. From the ridgetops and extensive forests of the Highlands in the northwest, to the waterways of the Delaware River Basin, to the Atlantic and Delaware Bay coastal beaches and salt marshes, to the unique ecosystem of the Pinelands, New Jersey is composed of a remarkable assortment of habitats. People have begun to appreciate the benefits and necessity of protecting these natural areas. For example, we know that wetlands play a critical role in lessening the severity of floods and naturally breaking down contaminants in the environment. Forests and grasslands protect the quality of our drinking water, improve the quality of the air we breathe and provide important areas for outdoor recreation. Collectively, these habitats are of critical importance to the diverse array of wildlife found in New Jersey, including endangered, threatened and special concern species.

Meanwhile, wildlife populations, particularly imperiled wildlife, face an array of interrelated pressures that impede their ability to maintain themselves in the state. These include invasive species, chemical contaminants, road mortality, human disturbance, and, most importantly, habitat loss, fragmentation and degradation resulting from poorly planned development patterns. These and other stressors are all occurring in the context of the developing impacts of climate change that will likely exacerbate the existing threats to wildlife species and habitats.



Originating high atop the Kittatinny Ridge in Stokes State Forest, small, clean, flowing streams provide critical habitat for a variety of imperiled and special concern species.

Habitat loss due to large lot low-density residential development.

LANDSCAPE PROJECT 3.3: CONSERVING IMPERILED WILDLIFE OF NEW JERSEY

The Landscape Project provides a starting point from which to develop strategies for the protection and enhancement of habitat for New Jersey's imperiled wildlife. In 1994, the New Jersey Division of Fish and Wildlife's (DFW) Endangered and Nongame Species Program (ENSP) adopted a landscape level approach to endangered, threatened and special concern species conservation by developing the Landscape Project. Through geographic information systems (GIS) technology, the Landscape Project uses documented species location data and land-use/land-cover as well as species life history information to produce maps that depict habitat for endangered, threatened and special concern wildlife species throughout the state. The goal of the project is to provide a tool that fosters protection of New Jersey's biological diversity by facilitating the recovery and sustainability of endangered, threatened and special concern wildlife populations within healthy, functioning ecosystems.

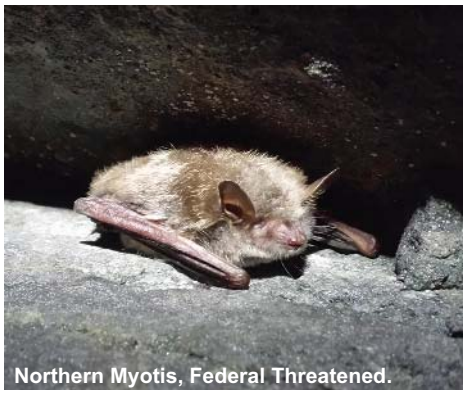
Piping Plover, Federal Threatened.

Spatterdock Darner, Special Concern.

A NEW VERSION OF THE LANDSCAPE PROJECT

The previous version of the Landscape Project was based on species occurrence data collected prior to 2012 and habitat data derived from 2007 Land Use/Land Cover (LULC). Since that time, more than 3,400 new species occurrence records have been added to New Jersey's Biotics database and habitat data has been updated to reflect the most recent (2012) LULC. In addition, the new version incorporates species not previously represented in the Landscape Project, including Atlantic sturgeon and northern long-eared bat (northern myotis).

Atlantic Sturgeon, Federal Endangered.


Northern Myotis, Federal Threatened.

Version 3.3 of the Landscape Project applies to the entire state a methodology that was developed under peer-review. It includes precise methods for delineating habitat based on species-specific habitat associations. In addition to providing access to a list of species that occur in an area of interest defined by a user, Version 3.3 provides detailed information, including the type of occurrence, or feature label (e.g., colony, den, nest, foraging, etc.), and the last recorded year of occurrence.

In Version 3.3 of the Landscape Project, all information has been updated to reflect

- the existing endangered species list and the nongame wildlife list
- a standard, consistent, peer-reviewed method applied throughout the state
- over 3,400 new species occurrence records in the Biotics database
- the most recent Land Use/Land Cover data from 2012

The information available in Version 3.3 includes enhancements that

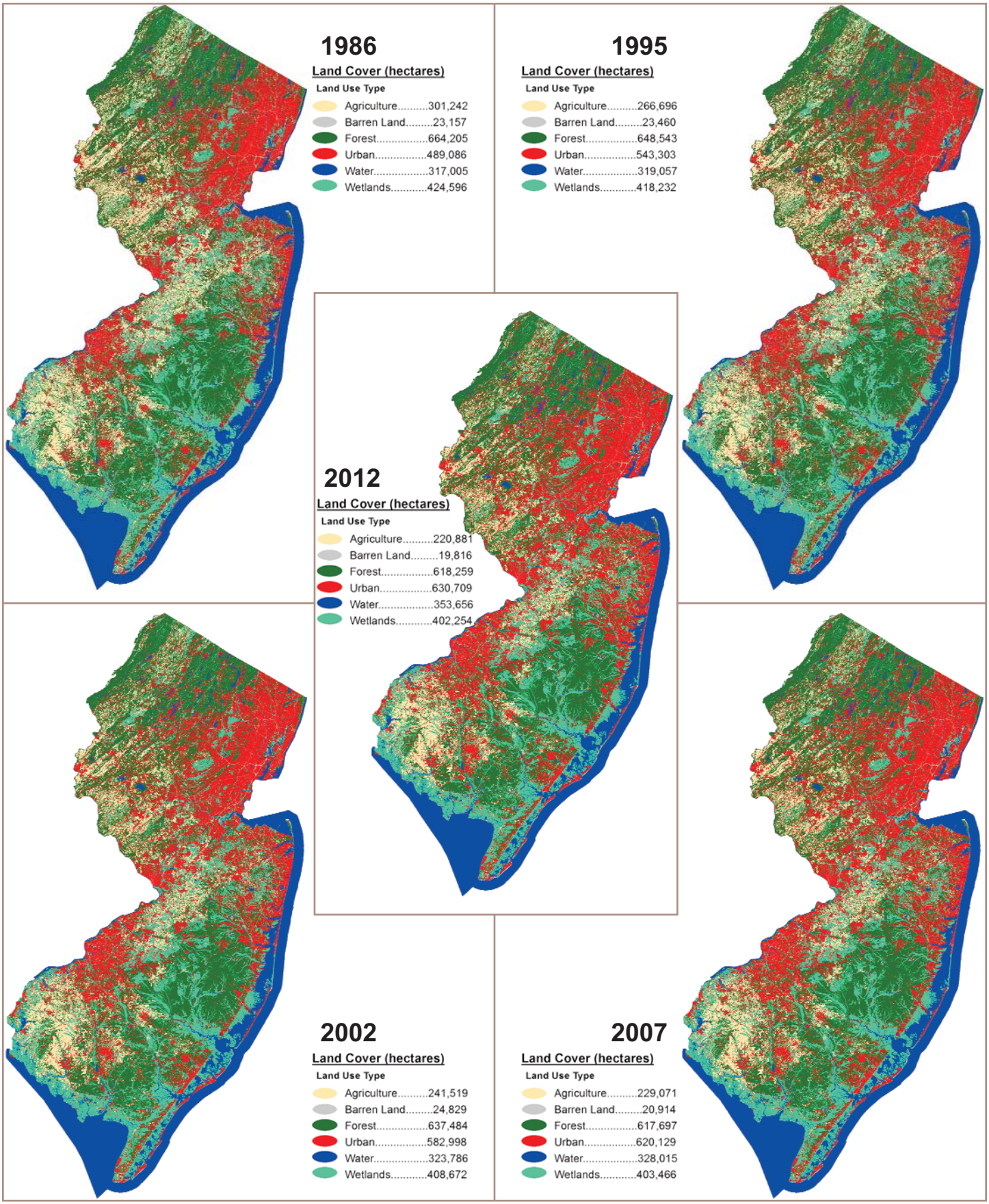
- provide precise habitat mapping built on species-specific habitat associations
- encompass species previously not represented, including Atlantic Sturgeon, Carpenter Frog and Northern Long-eared Bat
- provide detailed species information, such as type of occurrence and last year of occurrence
- transparently document the mapping method that is based on scientific literature

Perhaps most importantly, Version 3.3 features easily accessible documentation that includes transparent descriptions of the methods used and references to supporting scientific literature. Many of these enhancements are a result of recommendations that ENSP has received from the public through outreach efforts and information obtained from evaluation forms completed by attendees of Landscape Project training and information sessions conducted over several years. Additional feedback was received during an evaluation of the Landscape Project maps conducted in partnership with the Endangered and Nongame Species Advisory Committee (ENSAC). The evaluation process included two stakeholder meetings that generated constructive input from a cross-section of Landscape Project end-users representing federal agencies, county governments, environmental commissions and the consultant community.

WHY WE NEED THE LANDSCAPE PROJECT

New Jersey's landscape is rapidly changing. As the most densely populated state in the nation, pressure to consume land for development has increased as the population has grown. Yet population growth cannot be isolated as the only, or even the primary, driving force of habitat loss in New Jersey. Instead, land has been consumed for residential development at nearly twice the rate of population growth over the past two decades as a result of a large-lot, area-intensive land use zoning and development pattern that has encroached on rural landscapes throughout the state (Hasse & Lathrop 2008, 2010; Hasse et al. 2010). Such a land development pattern also contributes to higher traffic volumes that can lead to increased wildlife mortality or create complete barriers to movement for certain species (Seiler 2003; Fahrig & Rytwinski 2009).

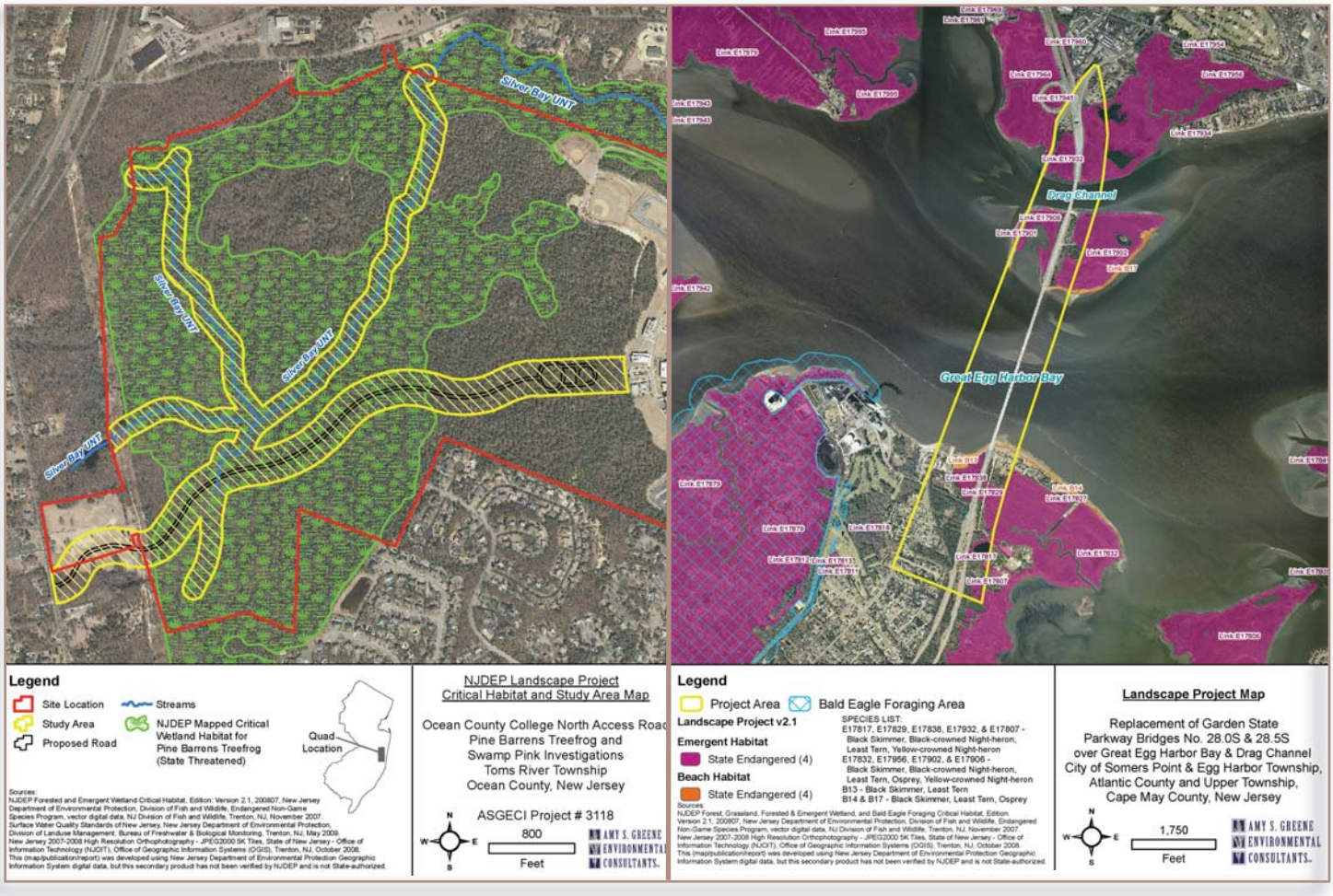
A detailed landscape analysis performed by Hasse and Lathrop (2010) that utilized DEP Land Use/Land Cover (LULC) datasets from 1986 to 2007 revealed that a sprawl development pattern continued undeterred and actually gained momentum over the two decade period. Breaking the study into three time periods (1986-1995, 1995-2002, 2002-2007), the analysis shows a "7% increase in the development rate to 16,061 acres of urbanization per year by 2007, up from the previous rate of 15,123 acres per year during the 1995 through 2002 time period," which also experienced an increase up from the rate of 14,866 acres per year in the 1986 through 1995 time period (Hasse & Lathrop 2010, p.4). Increasing deforestation, largely due to sprawling residential development, led to urban land surpassing forest land as the most prominent land type covering the state as of 2007 (Hasse & Lathrop 2010). Studies project that if the current building pattern continues, all remaining available land will be developed sometime in the middle of this century, making New Jersey possibly the first state in the nation to reach build-out (Hasse & Lathrop 2001, 2010). The Landscape Project serves as a tool to help facilitate growth patterns more sensitive to the needs of wildlife and their habitats.



NJDEP Land Use/Land Cover 1986 - 2012. New Jersey's Landscape is rapidly changing. In the 1986 - 2007 period, urbanization resulted in the loss of approximately 5,000 hectares of wildlife habitat per year. Although this rate slowed significantly in the 2007 - 2012 period, much of the habitat that remains is less suitable for wildlife due to habitat fragmentation. This is especially detrimental to imperiled wildlife, as many of these species require large, contiguous tracts of habitat.

THE PURPOSE OF THE LANDSCAPE PROJECT

The Landscape Project was designed to provide users with peer-reviewed, scientifically sound information that transparently documents threatened and endangered species habitat. Landscape Project data are easily accessible and can be integrated with the planning, protection and land management programs of non-government organizations and private landowners and at every level of government – federal, state, county and municipal. Landscape maps and overlays provide a foundation for proactive land use planning, such as the development of local habitat protection ordinances, zoning to protect critical wildlife areas, management guidelines for imperiled species conservation on public and private lands, and land conservation projects. The maps help increase predictability for local planners, environmental commissions, and developers, and help facilitate local land use decisions that appropriately site and balance development and habitat protection. The Landscape Project maps allow the regulated public to anticipate potential environmental regulation in an area and provide some level of assurance regarding areas where endangered, threatened or species of special concern are not likely to occur, affording predictability to the application and development process. Thus, Landscape Project maps can be used proactively by regulators, planners and the regulated public in order to minimize conflict and protect imperiled species. This minimizes time and money spent attempting to resolve after-the-fact endangered and threatened species conflicts.



Landscape Project data used for project review: Left) Landscape Project data used to show the extent of Pine Barrens Treefrog habitat in order to determine if a proposed new access road for the Ocean County College campus would impact this species. Right) Landscape Project data used to help conduct a habitat assessment for a proposed Garden State Parkway bridge replacement project over Great Egg Harbor Bay and Drag Channel in Atlantic and Cape May counties. The map shows areas of suitable habitat capable of supporting State and Federal listed threatened and endangered species within the project area, including Black Skimmer, Black-crowned Night-heron, Yellow-crowned Night-heron, Least Tern, and Osprey.

A volunteer plants a native tree seedling on an old fairway inside Cox Hall Creek Wildlife Management Area to help restore forested habitat that will benefit migratory songbirds and other wildlife.

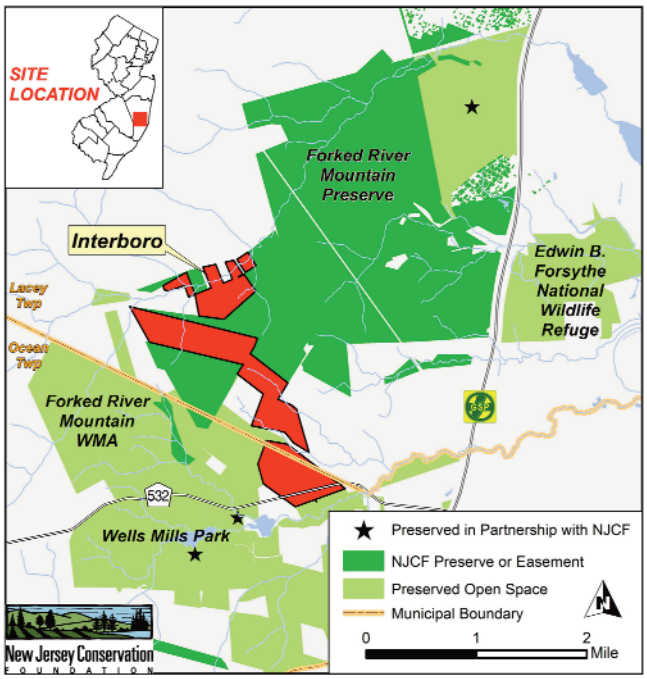
LANDSCAPE PROJECT APPLICATIONS

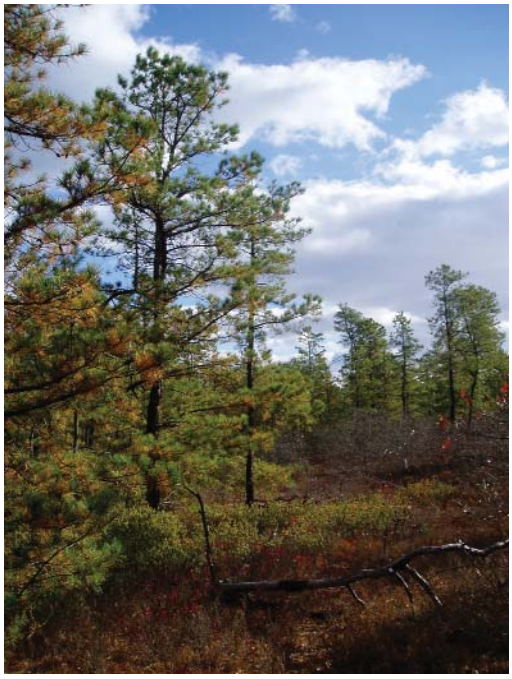
DEP Agencies:

NJDEP's Natural and Historic Resources: The Natural & Historic Resources (N&HR) programs within NJDEP are responsible for managing over 900,000 acres of parks and forests, recreation areas, historic sites, wildlife management areas, and natural areas. Managing these lands in a manner that avoids harm to imperiled species habitats requires that land managers subject proposed activities to an internal review process before undertaking any activity on state lands that may modify the terrestrial or aquatic landscape. Land managers use Landscape Project maps to conduct an initial screening to determine the presence of habitat patches ranked 3, 4 or 5. If these features are on the proposed project site the land manager is required to request a detailed review by ENSP. This review allows land mangers to alter proposed activities in a manner that avoids or minimizes damage to critical imperiled species habitat.

Division of Fish and Wildlife's Landowner Incentive Program: The Landscape Project is an important tool for the Landowner Incentive Program (LIP). When applications are submitted to LIP, biologists use the Landscape Project as a screening tool to determine the species that may inhabit the site. Based on the Landscape Project and the project description, biologists determine if the project warrants a site visit and use the Landscape Project to create a map of the site and surrounding landscape. LIP staff also use the Landscape Project to support the species and habitat management plan developed for each property.

Green Acres: The Landscape Project is used by the Department's Green Acres Program to support the preservation of high quality natural resources in three valuable ways. First, the mapped data is represented on site-specific planning maps showing habitat locations so that consideration is given to these prime areas during decision making. Site specific maps are also submitted as part of the application for the Federal Land and Water Conservation Fund to show characteristics of those applicant properties. Lastly, but perhaps most importantly, the data is used in the evaluation of lands offered to the State for acquisition. The Green Acres Program scores all land offers based on their natural resource values. Wildlife occurrence is one of the criteria evaluated. The Landscape Project data format allows for statistical analysis to determine the quality and quantity of state and federal endangered species habitats on the offered properties.





Green Acres provided grant funding to the New Jersey Conservation Foundation to help purchase the Interboro tract in the Forked River Mountains area that serves as habitat for a number of threatened and endangered wildlife species.

Division of Land Use Regulation: The Division of Land Use Regulation (DLUR) uses the Landscape Project maps to identify habitat for endangered and threatened species and to help apply regulations designed to protect those areas. Several state land use regulations contain provisions for the protection of habitats determined to be critical to endangered and threatened wildlife. These include the Coastal Permit Program Rules (N.J.A.C 7:7), the Coastal Zone Management Rules (N.J.A.C. 7:7E), the Freshwater Wetlands Protection Act Rules (N.J.A.C. 7:7A), the Flood Hazard Area Control Act Rules (N.J.A.C. 7:13), the Highlands Water Protection and Planning Act Rules (N.J.A.C. 7:38), and the Water Quality Management Planning Rules (N.J.A.C. 7:15).

Landscape Project data are reviewed to help determine whether a particular site contains "documented habitat" for State or Federal listed species. Within areas of documentation, ground surveys are typically conducted to confirm actual site suitability for a specific documented species. Permit applications received by DLUR are now better prepared because the public has access to the Landscape Project data. Since applicants now have access to baseline data concerning endangered and threatened species occurrences, they can better address potential impacts to State or Federal listed species in their permit applications or environmental impact statements, thereby minimizing environmental impacts and the time required to issue permits.

Federal Agencies:

U.S. Fish and Wildlife Service: The U.S. Fish and Wildlife Service (USFWS), New Jersey Field Office staff use the data layers in the Landscape Project to assist with project planning, assessment, and implementation of habitat restoration projects through the *Partners for Fish and Wildlife* program. Specifically, information in the Landscape Project on wetlands, sensitive species, grasslands, and other habitat types assist USFWS in large-scale geographic planning and targeting of habitat restoration projects. The Landscape Project is also useful for site-specific assessments of wetland restoration and creation opportunities.

U.S. Department of Agriculture Natural Resources Conservation Service: The Natural Resources Conservation Service (NRCS) has utilized the Landscape Project for several years as part of its day to day activities. NRCS field staff conducts environmental evaluations for all projects where federal funds are utilized as part of its National Environmental Policy Act (NEPA) responsibilities. These evaluations include threatened and endangered species assessments of planned NRCS actions.

The Landscape Project provides invaluable information regarding the possibility of threatened and endangered species occurrence at a site and helps guide NRCS planning efforts. The Landscape Project has also been used for several years in the competitive ranking of Wildlife Habitat Incentive Program (WHIP) projects. Projects that will have positive impacts to threatened and endangered species habitat receive additional points in the WHIP ranking system and have a greater chance of being funded. The Landscape project data is used as the basis for the threatened and endangered portion of the ranking.

This farm in Harmony Township, Warren County, falls within a high-priority grassland bird conservation area. The landowner planted more than 100 acres of perennial grasses with assistance from the NJ Landowner Incentive Program (LIP), US Fish and Wildlife Service, NRCS, New Jersey Audubon, and Conserve Wildlife Foundation of NJ. The fields remain un-mowed during the bird nesting season to allow species like the bobolink, grasshopper sparrow, and eastern meadowlark to nest and fledge their young.

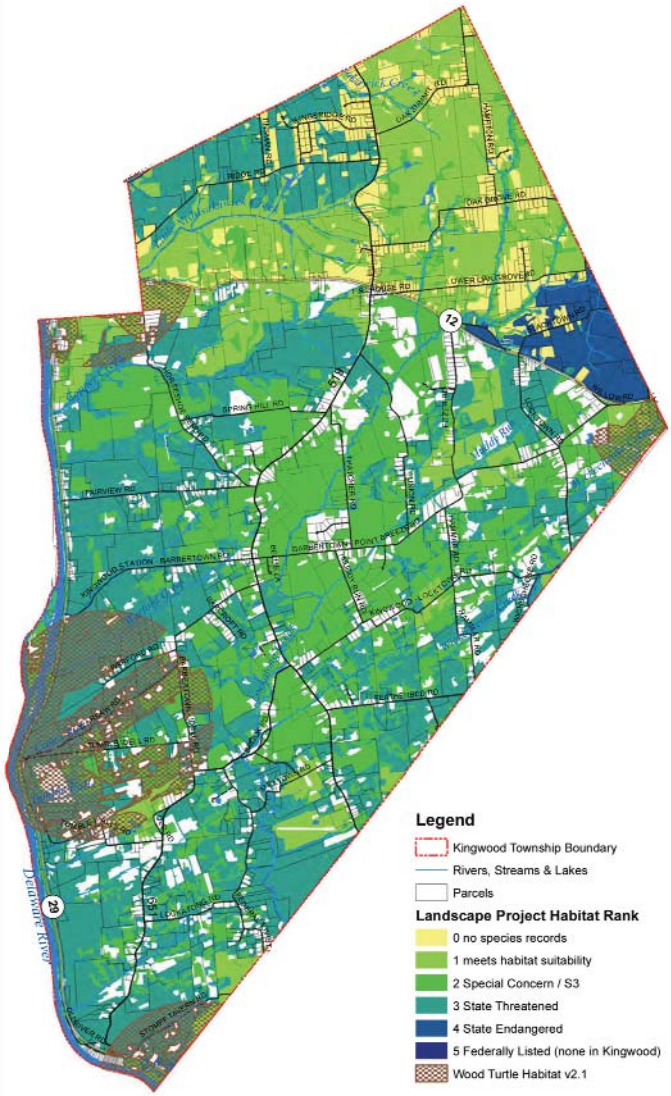
Landscape Project maps enable state, county, municipal and private agencies to identify important habitats and protect them in a variety of ways:

Prioritize conservation acquisitions: The Landscape Project is used to assist with prioritizing land parcels for purchase through acquisition programs such as Farmland Preservation and the USFWS's refuge system.

Guide regulators and planners: Landscape Project maps provide those who administer land use regulations and state, county and local planners with a crucial tool used to enhance protection and properly plan development through the regulatory and planning process.

Provide citizens with conservation tools: The Landscape Project provides a transparent and readily accessible tool to help guide citizen actions to protect imperiled and special concern species habitat at the local level.

Guide stewardship of conserved areas: New Jersey has more than 400,000 hectares of open space. These lands are managed by a variety of agencies and organizations, both public and private. Landscape Project maps identify important imperiled and special concern species habitats on these lands. ENSP staff work closely with land managers and landowners to develop appropriate best management practices for the long-term conservation of imperiled and special concern species.



Landscape Project maps are widely used in municipal and county Environmental Resource Inventories (ERI) to document threatened and endangered wildlife habitat. ERI for Kingwood Township, Hunterdon County, shown above.

WHO BENEFITS

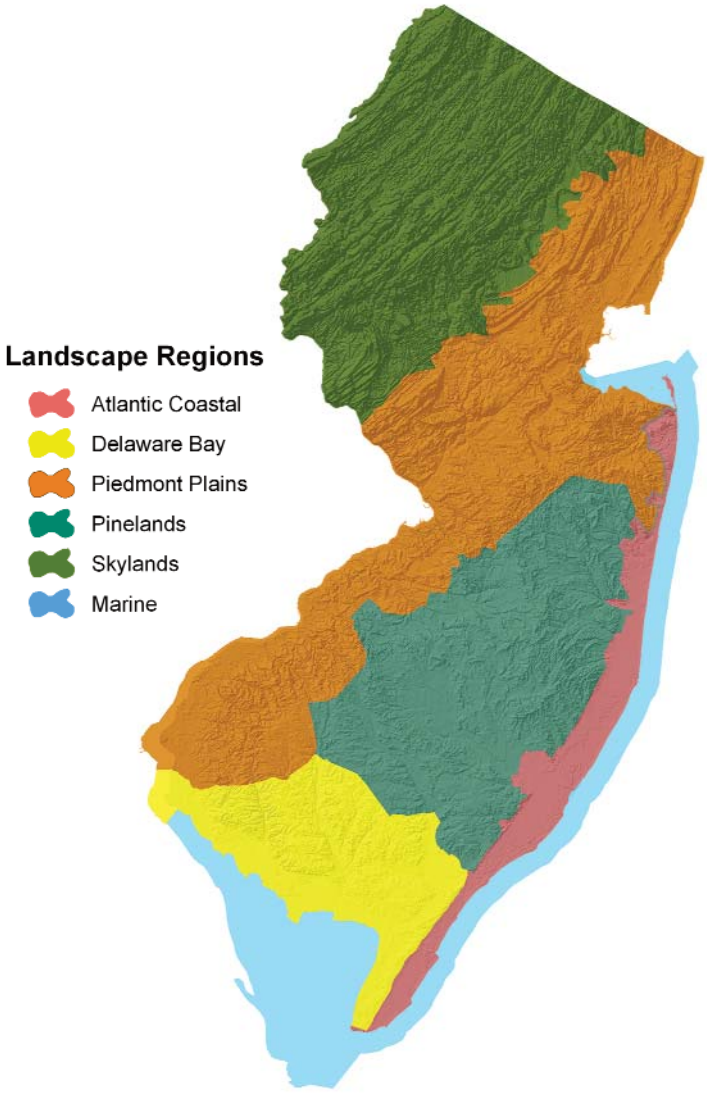
Conservation of large expanses of fields, forests and wetlands helps to ensure that wildlife will remain a part of New Jersey's future. Conserving imperiled and special concern species habitat identified in the Landscape Project also results in more land contributing ecosystem services and more open space for outdoor recreation. Surveys by the US Fish and Wildlife Service (2006) reveal more than 87.5 million U.S. residents sixteen and older participate in some form of wildlife-related recreation. Open spaces provide places where people can escape the confines and stresses of urban and suburban living. Retaining habitats in their natural state provides other benefits such as reducing the threat of flooding, allowing for the biodegradation and filtering of environmental contaminants and recharging ground water reserves. In short, planning that employs the Landscape Project habitat mapping provides potential benefits for everyone.

CHAPTER 2

New Jersey's Diverse Landscapes

The Palisades cliffs rising next to the Hudson River are one of the historic habitats for nesting Peregrine Falcons, which recolonized the area in 2003 after an absence of more than 50 years.

New Jersey's dunes, beaches, tidal marshes, cedar swamps, vast pitch pine forests, extensive grasslands, peat bogs, maple-oak forests, ridgetops, brackish bays, rivers, streams and the Atlantic Ocean support an amazing array of wildlife. That is true despite the fact that much of its diverse landscape has been greatly altered by human enterprises such as agriculture and development that fragments and degrades wildlife habitat. Sustaining wildlife populations over time requires large healthy landscapes with broad expanses of natural habitat. Thus, the Landscape Project focuses on ecoregions or Landscape Regions where plant and animal communities are ecologically similar and closely interlinked.



New Jersey's Landscape Regions.

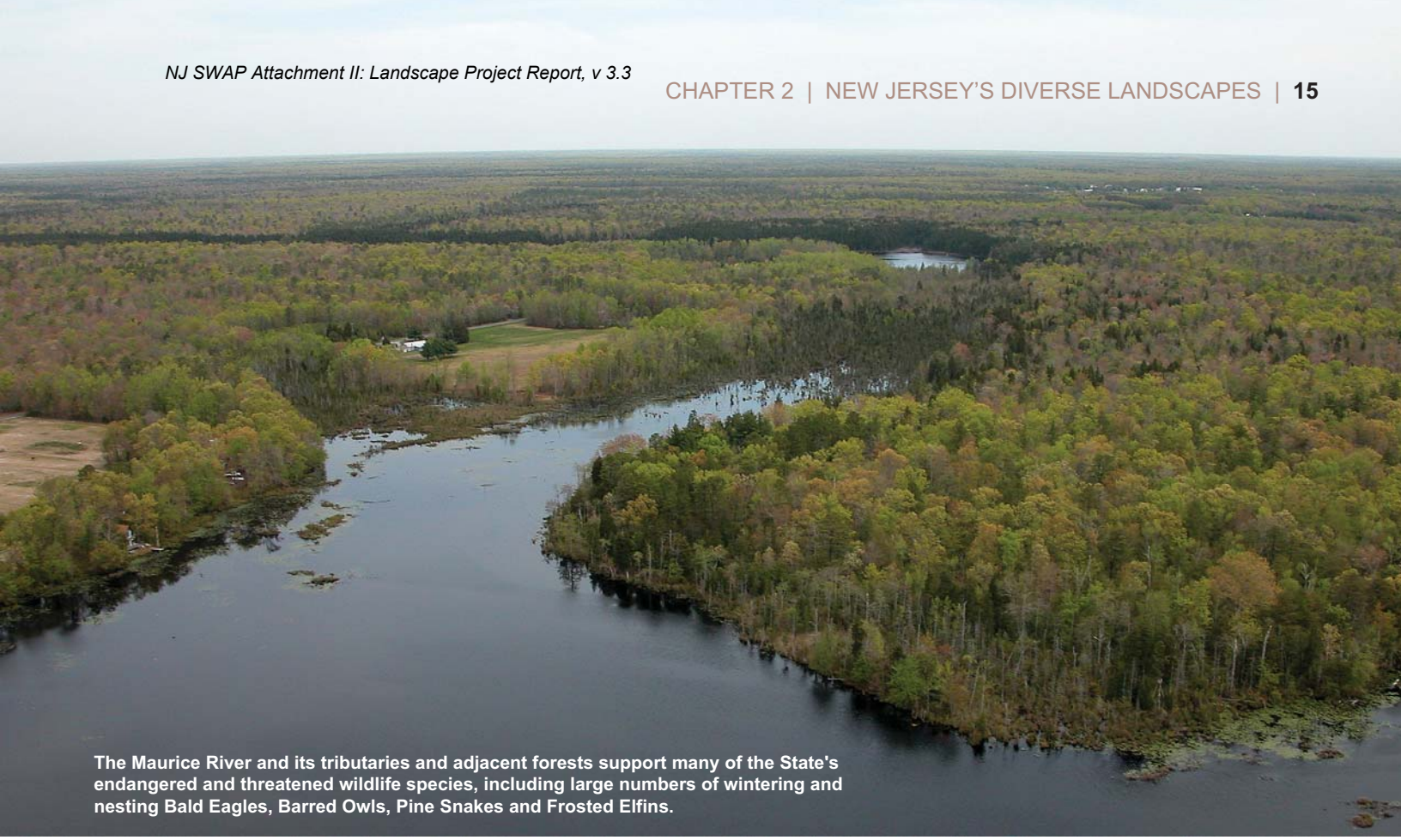
The delineation of the state into regions serves as a spatial framework for management and conservation of species and their habitats, and as a means to organize information so that it is meaningful and widely accessible to end-users. Geographic features and landforms (e.g., rivers, watershed boundaries, ridgelines, soils, vegetation, etc.) were used to delineate the general area of five Landscape Regions in New Jersey. Region boundaries were shifted to align with major roads (county level or larger) that serve as barriers to movement for many species. A sixth region, the Marine Region, is an exclusively aquatic region that includes the New Jersey portion of the Delaware and Raritan bays as well as the portion of the Atlantic Ocean along the coast of New Jersey. ENSP has identified and mapped habitat for endangered, threatened and special concern wildlife within each Landscape Region utilizing an extensive database that combines species occurrence information with Land Use/Land Cover classification data and species habitat requirements. The resulting Landscape maps provide an accurate, reliable and scientifically sound basis for habitat protection within each region.

One of the Landscape Project's unique features is that it enables users to focus on the big picture, and not just on individual locations of imperiled and special concern species as those areas come under threat. Thus, within large landscapes, the Landscape Project identifies areas of habitat that are important to the maintenance and recovery of New Jersey's endangered and threatened wildlife populations.

ATLANTIC COASTAL LANDSCAPE

This landscape encompasses parts of Monmouth, Ocean, Cape May, and Atlantic counties. New Jersey's Atlantic Coast beaches and marshes are among the most productive coastal habitats in the country. Despite heavy development, they support important portions of Atlantic Coast populations of colonial nesting birds, such as common tern, little blue heron and great egret, and endangered beach-nesting birds such as least tern and piping plover. The coastal habitats also support most of the state's ospreys, peregrine falcons, northern harriers and northern diamondback terrapins, as well as large concentrations of migrating birds and wintering waterfowl.

Aerial view of Stone Harbor Point, a critcally important coastal site for breeding, migrating and wintering shorebirds of conservation concern.



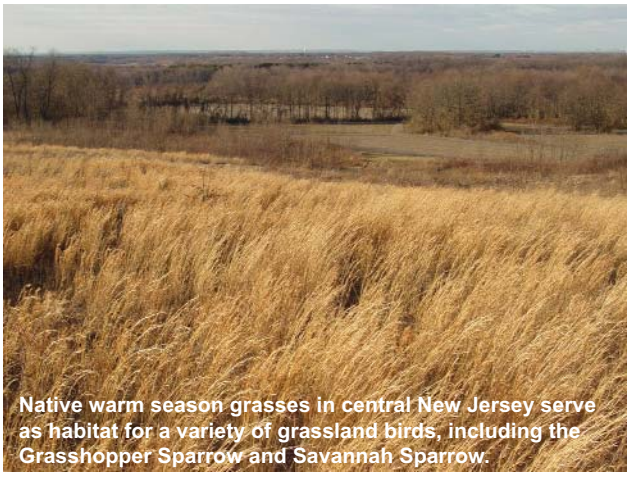
The Maurice River and its tributaries and adjacent forests support many of the State's endangered and threatened wildlife species, including large numbers of wintering and nesting Bald Eagles, Barred Owls, Pine Snakes and Frosted Elfins.

DELAWARE BAY LANDSCAPE

This landscape encompasses all or parts of Cape May, Atlantic and Cumberland counties. It features significant populations of bald eagle, barred owl, eastern tiger salamander, Cope's gray treefrog and 30 other endangered and threatened species. The vast woodland tracts of this region are among the largest in the state and support a large portion of New Jersey's neotropical birds and interior-forest bird populations. The extensive saltwater marsh and sandy overwash beaches support a significant horseshoe crab breeding area and shorebird migrations of worldwide ecological significance, including that of the red knot. Despite significant losses of habitat, the Cape May Peninsula remains one of the country's most important migratory "stopovers" for hundreds of bird and insect species. The expansive habitat mosaic of rivers and streams flowing into the tidal Delaware Bay supports concentrations of rare wildlife and wintering waterfowl.

PIEDMONT PLAINS LANDSCAPE

This landscape region also combines two of New Jersey's physiographic regions, the Piedmont and the Inner Coastal Plain. It encompasses all or parts of Burlington, Camden, Gloucester, Salem, Mercer, Middlesex, Monmouth, Hunterdon, Somerset, Union, Essex, Hudson, Passaic, and Bergen counties. It is dominated by the Delaware and Raritan rivers and is characterized by farmed areas, extensive grasslands, fragmented woodlands and productive tidal marshes. Imperiled species within this landscape include grassland birds such as the endangered upland sandpiper and raptors such as the American kestrel and barred owl.



Native warm season grasses in central New Jersey serve as habitat for a variety of grassland birds, including the Grasshopper Sparrow and Savannah Sparrow.

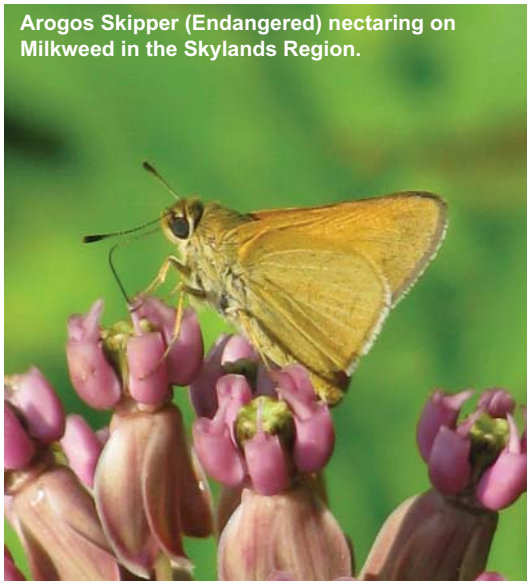
Vast tracts of pine and pine-oak forests of the Pinelands Region provide habitat for many imperiled species including the Threatened Northern Pine Snake and Pine Barrens Treefrog.

PINELANDS LANDSCAPE

This landscape encompasses all or parts of Atlantic, Ocean, Burlington, Camden, and Gloucester counties. An internationally recognized ecosystem, the Pinelands supports extremely diverse reptile, amphibian and invertebrate populations including northern pine snake, corn snake, Pine Barrens treefrog, and Pine Barrens bluet. Extensive cedar swamps and wetland systems contain numerous insect species, as well as sustainable populations of many neotropical birds. Its waterways support aquatic communities unique among mid-Atlantic states.

SKYLANDS LANDSCAPE

This landscape region combines two of New Jersey's physiographic regions, the Ridge and Valley and the Highlands. It encompasses all or parts of Sussex, Warren, Hunterdon, Somerset, Passaic, Essex, Bergen, and Morris counties. The region contains extensive tracts of contiguous upland and wetland forests that support diverse animal populations including red-shouldered hawk, northern goshawk, cerulean warbler, timber rattlesnake, long-tailed salamander, arogos skipper and the state's only known wintering populations of Indiana bat. Bog turtles and great blue herons inhabit the extensive freshwater wetland systems found throughout the region.



Arogos Skipper (Endangered) nectaring on Milkweed in the Skylands Region.

MARINE REGION

This region is an exclusively aquatic region that includes the New Jersey portion of the Delaware and Raritan bays. It also includes the portion of the Atlantic Ocean within New Jersey's jurisdiction, which is defined as the area within 3-nautical miles of the New Jersey shoreline. This region supports commercially valuable shellfish resources as well as a number of fish species of commercial and recreational importance. Over half of New Jersey's Federal listed species are found exclusively within this region, including several species of whales and sea turtles. The endangered shortnose sturgeon is also found within Delaware Bay. Waters of the Delaware Bay are also critical habitat to one of the largest populations of horseshoe crab in the world. During the summer, near-shore Atlantic Ocean waters are calving and nursery grounds for bottlenose dolphins while many additional species utilize these waters as a migratory corridor.

New Jersey's coastal waters provide a critical migratory corridor to Humpback Whales (Federal Endangered).

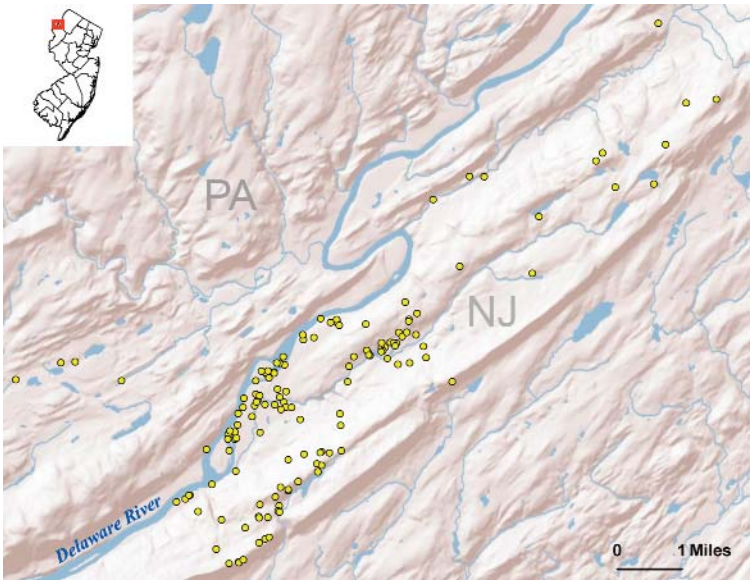
CHAPTER 3
A Method for Delineating Imperiled and Special Concern Wildlife Habitat

Version 3.3 of the Landscape Project is composed of three spatial components: Species-Based Habitat, Freshwater Mussel Habitat and Vernal Habitat. **Species-Based Habitat**, the main component of the project, identifies imperiled and special concern wildlife habitat within each Landscape Region, with the exception of freshwater mussels. **Freshwater Mussel Habitat** is a separate layer that identifies those stretches of stream that serve as habitat for endangered, threatened and special concern freshwater mussel species. Lastly, **Vernal Habitat** identifies not only vernal and potential vernal pools themselves, but also surrounding habitat that allows for successful breeding, dispersal, foraging, overwintering, and migration of species that use vernal pools.

SPECIES-BASED HABITAT

Illegal collection continues to impact the Bog Turtle (Federal Threatened).

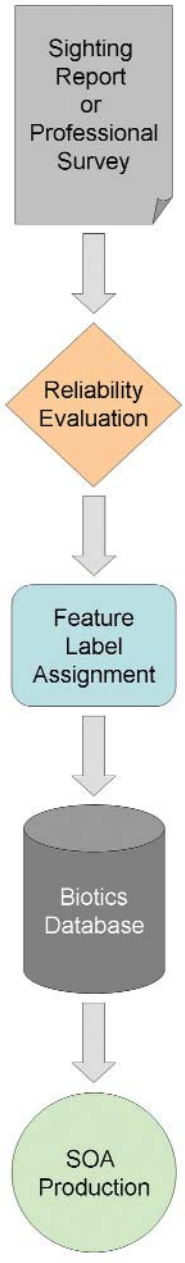
The Landscape Project combines documented wildlife locations with NJDEP aerial photo-based 2012 Land Use/Land Cover (LULC) to delineate imperiled and special concern species habitat within New Jersey. Many species occurrence locations cannot be published because they may represent nest sites, roost sites, dens and other sites used by species that are vulnerable to human disturbance and, in some cases, susceptible to illegal collecting. At the same time, wildlife moves and individual animals use various habitat features within the landscape to fulfill their foraging, sheltering and breeding needs. Therefore, protecting individual occurrences or the area used by one individual is generally not sufficient to protect the local population. Landscape Project maps address these issues by displaying habitat patches that animals use and that are required to support local populations, rather than pinpointing exact locations of the most sensitive wildlife sites or simply protecting points where species happened to be observed at one point in time. Prior to combining species occurrence data with LULC data to form the habitat patches that make up the Species-Based Habitat layer, each dataset is generated according to a specific data development process.



Left) Shown in yellow are locations of a male Bobcat (Endangered) fitted with a GPS collar by ENSP between March 2004 and July 2005 near the Delaware Water Gap, NJ. The cat crossed the Delaware River into Pennsylvania on three different occasions. Above) Bobcat at the Delaware Water Gap in early spring.

SPECIES OCCURRENCE DATA DEVELOPMENT

Imperiled and special concern wildlife occurrence data are stored and managed in the New Jersey Biotics database. Developed by NatureServe, Biotics software provides established scientific standards for biological inventory and biodiversity data management used by most states, Canada, Latin America and the Caribbean, for tracking species. Imperiled and special concern species records within the New Jersey Biotics database are based on field observations from a variety of sources including reports from the general public, ENSP surveys, and other professional surveys, including those conducted by government agencies and environmental consultants. All records undergo rigorous evaluation performed by ENSP biologists for inclusion into the system according to an established protocol to ensure reliability *(**Appendix I**)*. Moreover, in order for a species occurrence in Biotics to be used in the Landscape Project, it must meet the following additional criteria: the species status must be endangered, threatened or special concern; it must be a "high accuracy" record according to NatureServe (accurate within 6-50 meters [most fall within 20 meters]); it must have a 1980 or later last observation date; and it must be an occurrence associated with habitat essential for survival such as a breeding or foraging site. For example, an occurrence of a migrating bird that is included in Biotics may not be included in the Landscape Project maps if it does not rely on habitat within New Jersey for survival.



Data development process for species occurrence areas.

All occurrences receive a "location use class" as well as a "feature label" designation. Both of these are used to record more information about the occurrence. A location use class is specified for migratory species and indicates the season or behavior that is associated with the occurrence. A feature label describes the type of occurrence (e.g., nest, den, etc.). A single species occurrence may represent one individual animal (for example, a single timber rattlesnake observed on a rock) or multiple individuals (for example, a timber rattlesnake den supporting many individuals), distinctions indicated by the feature label.

Timber Rattlesnake (Endangered) dens support multiple snakes that return year after year to the same den location.

ENSP has defined a "species occurrence area" (SOA) for every feature label assigned to a species (***Appendix II***). A SOA is a polygon specific to each species-feature label combination that is applied to each occurrence location and used to value habitat in the Landscape Project. The size of each SOA is generally based on the average home range or territory size, or other appropriate life-history parameters as reported in peer-reviewed scientific literature, or from information obtained through ENSP research and expert opinion. In the context of the Landscape Project, a SOA represents the habitat that supports the individual occurrence and often indicates the presence of a species population beyond the individual documented occurrence. A depiction of the SOAs for different types of Indiana bat feature labels is included in the table below.

Indiana Bats (Federal Endangered) with a small cluster of Little Brown Bats at a hibernaculum in northern New Jersey.

Feature Label	SOA
Hibernaculum	4 kilometer buffer
Non-breeding Sighting	2 kilometer buffer
Maternity Colony	2 kilometer buffer
Breeding Sighting	2 kilometer buffer

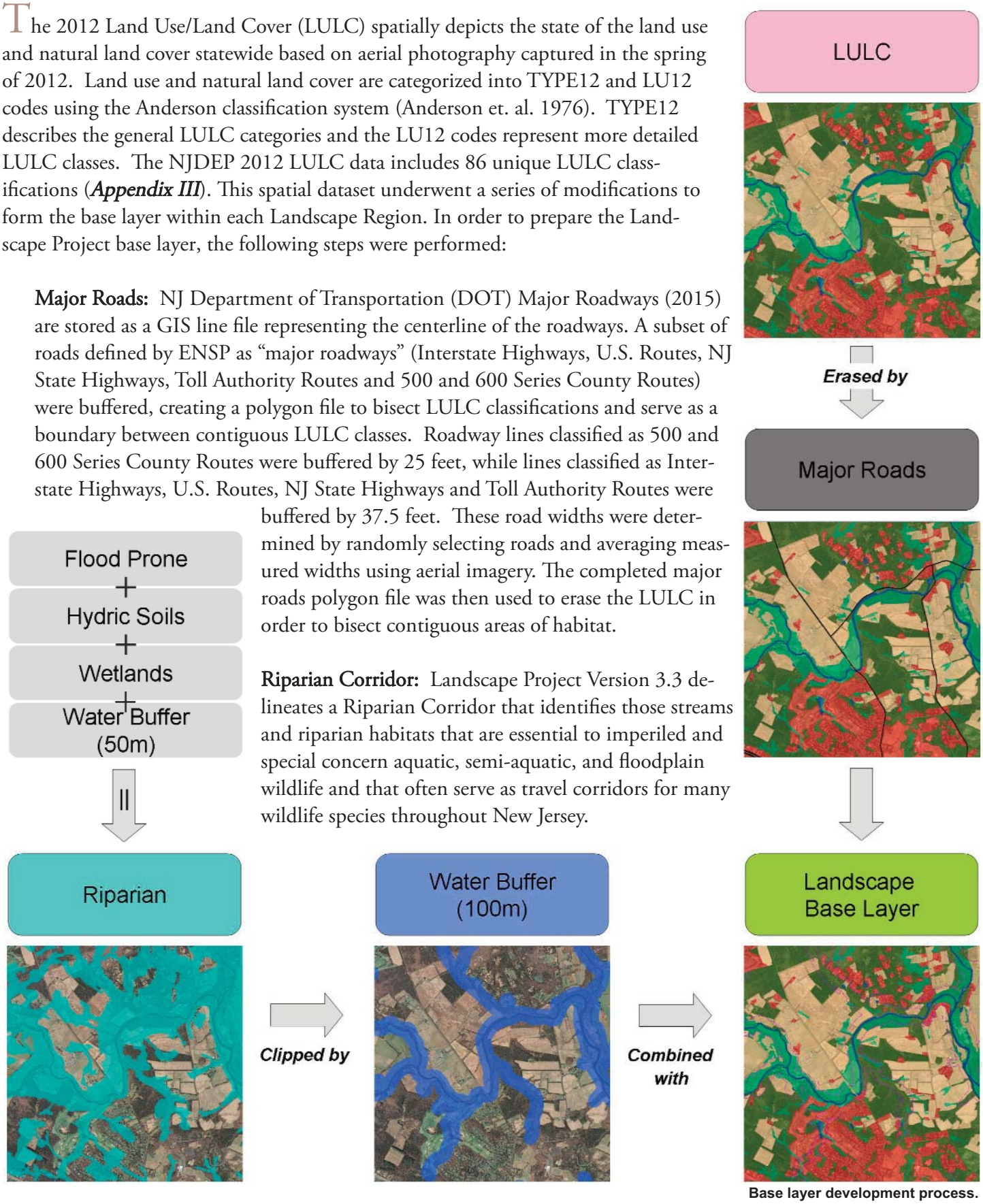
Indiana Bat Feature Labels and SOAs

LANDSCAPE BASE LAYER DEVELOPMENT

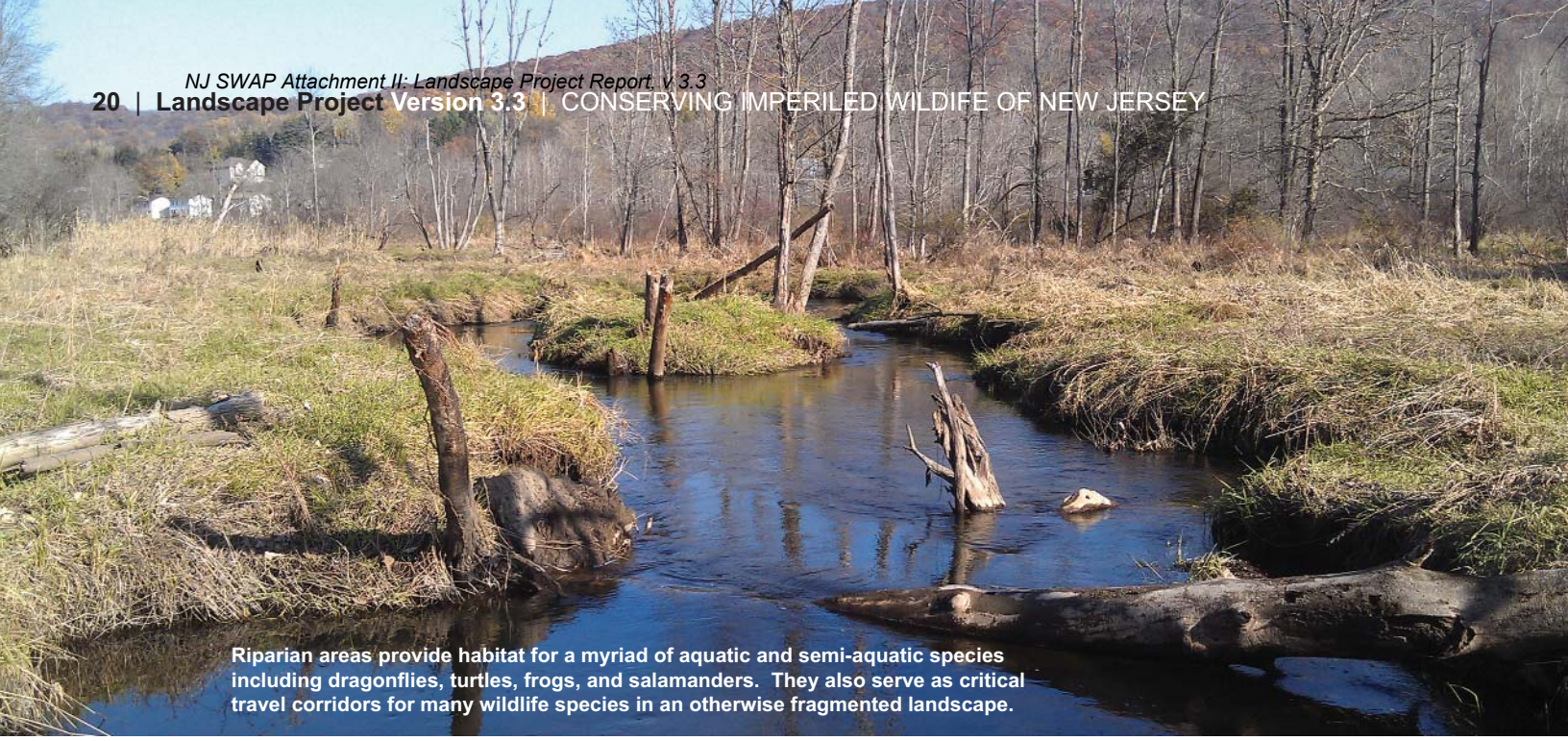
The 2012 Land Use/Land Cover (LULC) spatially depicts the state of the land use and natural land cover statewide based on aerial photography captured in the spring of 2012. Land use and natural land cover are categorized into TYPE12 and LU12 codes using the Anderson classification system (Anderson et. al. 1976). TYPE12 describes the general LULC categories and the LU12 codes represent more detailed LULC classes. The NJDEP 2012 LULC data includes 86 unique LULC classifications (***Appendix III***). This spatial dataset underwent a series of modifications to form the base layer within each Landscape Region. In order to prepare the Landscape Project base layer, the following steps were performed:

Major Roads: NJ Department of Transportation (DOT) Major Roadways (2015) are stored as a GIS line file representing the centerline of the roadways. A subset of roads defined by ENSP as "major roadways" (Interstate Highways, U.S. Routes, NJ State Highways, Toll Authority Routes and 500 and 600 Series County Routes) were buffered, creating a polygon file to bisect LULC classifications and serve as a boundary between contiguous LULC classes. Roadway lines classified as 500 and 600 Series County Routes were buffered by 25 feet, while lines classified as Interstate Highways, U.S. Routes, NJ State Highways and Toll Authority Routes were buffered by 37.5 feet. These road widths were determined by randomly selecting roads and averaging measured widths using aerial imagery. The completed major roads polygon file was then used to erase the LULC in order to bisect contiguous areas of habitat.

Riparian Corridor: Landscape Project Version 3.3 delineates a Riparian Corridor that identifies those streams and riparian habitats that are essential to imperiled and special concern aquatic, semi-aquatic, and floodplain wildlife and that often serve as travel corridors for many wildlife species throughout New Jersey.



Base layer development process.



Riparian areas provide habitat for a myriad of aquatic and semi-aquatic species including dragonflies, turtles, frogs, and salamanders. They also serve as critical travel corridors for many wildlife species in an otherwise fragmented landscape.

The inclusion of the Riparian Corridor makes the Landscape Project mapping a more comprehensive tool for planners, land managers, watershed agencies and associations, and other conservation organizations to protect aquatic wildlife habitat.

The Riparian Corridor was produced according to a modified version of a method developed at the Rutgers University Center for Remote Sensing and Spatial Analysis (CRSSA) by Hughes and Lathrop (2001). An area is defined as riparian if it is prone to flooding, contains hydric soils, or is delineated as freshwater wetlands. A number of changes were made to the CRSSA method as described below. There are multiiple GIS datasets used to create the ENSP riparian corridor: NJDEP USGS Flood-Prone Areas; FEMA flood data composite (DFIRMS, Preliminary FIRMS, Preliminary Work Maps, Q3) current as of April 2015; U.S. Department of Agriculture, Natural Resources Conservation Service Soil Survey Geographic Soils 2014 (SSURGO); NJDEP 2012 Land use/Land cover Update for New Jersey**;** NJDEP 2002 Streams Update for New Jersey. Unlike the CRSSA model, these datasets were used in their native vector format instead of converting them to a grid, or raster, format for analysis. Each dataset was recoded as follows:

NJDEP USGS Flood-Prone Areas – all areas coded as "1 USGS Documented Flood-prone Area" or "8 Water" are recoded as "1," all others recoded as "0."
FEMA flood data composite – all areas coded as A, AE, AH, AO, Open Water, VE recoded as "1."
SSURGO – all soils defined as "hydric" recoded as "1," all others recoded as "0."
NJDEP 2012 LULC – all Type12 coded as "wetlands" recoded as "1," all others recoded as "0."

All polygons coded as "1" from the above layers are combined and dissolved into one layer. Next, all streams (NJDEP 2002 Streams Update for New Jersey) and water bodies (NJDEP 2012 Land use/Land cover Update for New Jersey) with LU12 codes 1419, 5100, 5190, 5200, 5300 and 5410 are buffered by 50 meters to create a continuous corridor surrounding all water sources and to capture any areas that were not previously included because they were not coded as flood prone, hydric, or wetlands, or they occur as an urban LULC class, or are bounded by steep slopes. This 50 meter buffer is combined and dissolved with the previous layer into a riparian corridor. Next, all streams and water bodies are buffered by 100 meters. The dissolved riparian corridor created is then clipped by this maximum distance. Next, the streams layer is overlaid the resultant corridor. Any polygon that does not intersect the streams layer is deleted. The resulting layer is the final Landscape Project Riparian Corridor. This layer is combined with the NJDEP 2012 LULC dataset, to form the base layer for Version 3.3.

Marine Waters: The addition of the Marine Region in Version 3.3 allows for the inclusion of aquatic marine species that were not represented in previous versions of the Landscape Project. New Jersey's marine waters within the 2012 LULC dataset are mapped as extremely large polygons that are of little utility within the Landscape Project framework. Therefore, all marine waters coded as "Atlantic Ocean," "Open Tidal Bays," and "Tidal Rivers, Inland Bays, and Other Tidal Waters" are broken into a grid consisting of cells approximately 1.3 x 1.3 kilometers in size. This method thereby creates polygons which are much smaller, more meaningful, and consistent in the manner of their creation.

For marine species, a more refined approach towards mapping habitat would utilize mapped variables such as bathymetry, slope, sea surface temperature, current direction and velocity, submerged aquatic vegetation, and salinity. Although such information is available for some marine waters, it is absent in other areas and/or often incompatible across the region. It is this lack of a statewide multi-variable marine dataset that necessitates the current use of the gridded approach to mapping marine waters in the Landscape Project base layer.

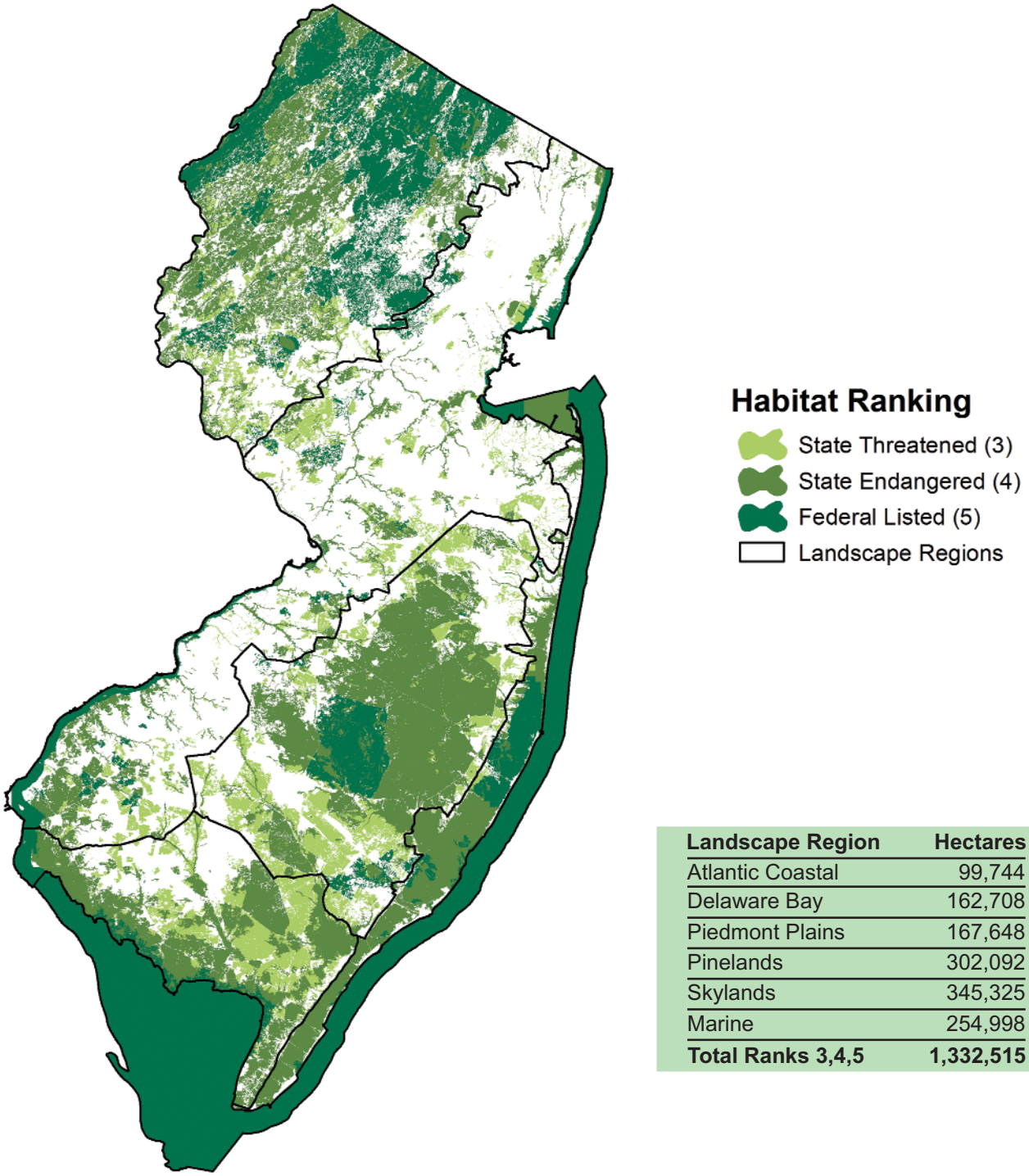
DELINEATING SPECIES-BASED HABITAT

In Version 3.3 a species-based habitat method is implemented by associating each species with a specific set of LULC classes according to the habitat needs of the species. Detailed LULC class delineations allow for an accurate representation of imperiled and special concern species habitat by providing ENSP biologists with the ability to designate a specific set of LULC classes for each individual species-feature label combination. Each species-habitat association is developed by performing a review of scientific literature and/or from information obtained through ENSP research and expert opinion. In addition, a special analysis of the LULC for species and their feature label components is used to guide the selection of particular LULC classes for the creation of species-specific patches of habitat (***Appendix IV***).

In order to create species-based patches of habitat, the relevant LULC polygons from the Landscape base layer are combined into a potential habitat layer specific to each species-feature label. Spatially explicit species occurrence data that meet the criteria required for inclusion in the Landscape Project are then exported from the Biotics database and a species occurrence area (SOA) is applied for every feature label assigned to a species. SOAs are then overlaid onto species-specific habitat patches and patches are classified, or "valued," based on the status of the species present as follows:

- **Rank 5 -** assigned to species-specific habitat patches containing one or more occurrences of wildlife listed as endangered and threatened pursuant to the Federal Endangered Species Act of 1973.
- **Rank 4 -** assigned to species-specific habitat patches with one or more occurrences of State endangered species.
- **Rank 3 -** assigned to species-specific patches containing one or more occurrences of State threatened species.
- **Rank 2 -** assigned to species-specific habitat patches containing one or more occurrences of species considered to be species of special concern.
- **Rank 1 -** assigned to species-specific habitat patches that meet habitat-specific suitability requirements such as minimum size or core area criteria for endangered, threatened or special concern wildlife species, but that do not intersect with any confirmed occurrences of such species (see ***Appendix V*** for descriptions of all habitat-specific suitability requirements). Rank 1 habitat patches without documented occurrences are not necessarily absent of imperiled or special concern species. Patches with a lack of documented occurrences may not have been systematically surveyed. Thus, the Rank 1 designation is used for planning purposes, such as targeting areas for future wildlife surveys.

A SOA will value habitat that it overlays only if that habitat is appropriate for the species. Habitat patches ranked 2, 3, 4, or 5 intersect with or contain at least one documented SOA. Since imperiled species are typically not abundant across the landscape, a single occurrence may represent a significant portion of the local population and often indicates the presence of a larger population within a habitat patch. The Landscape Project habitat patch mapping approach is designed to capture and represent the habitat needed to support the local population indicated by the individual SOA.



Landscape Region	Hectares
Atlantic Coastal	99,744
Delaware Bay	162,708
Piedmont Plains	167,648
Pinelands	302,092
Skylands	345,325
Marine	254,998
Total Ranks 3,4,5	**1,332,515**

Federal Listed (5), Endangered (4) and Threatened (3) Species-Based Habitat.

In the delineation of Species-Based Habitat, each species-feature label combination is assigned a "Patch Type," or category that describes the method employed to form the valued habitat area from polygons in the Landscape base layer. In addition, for each LULC class selected for a particular species-feature label combination, a "LULC Treatment," or rule, is applied that determines how polygons of a LULC class will interact with a SOA and/or with polygons of other LULC classes in order to construct patches of habitat. The four general patch types are described below and the LULC treatments are defined in ***Appendix V***. A comprehensive list of species-feature labels and their assigned patch type is included in ***Appendix V***. For those species-feature label combinations that utilize variations, or subtypes of the four general types, an explanation of the subtype is also included within ***Appendix V***.

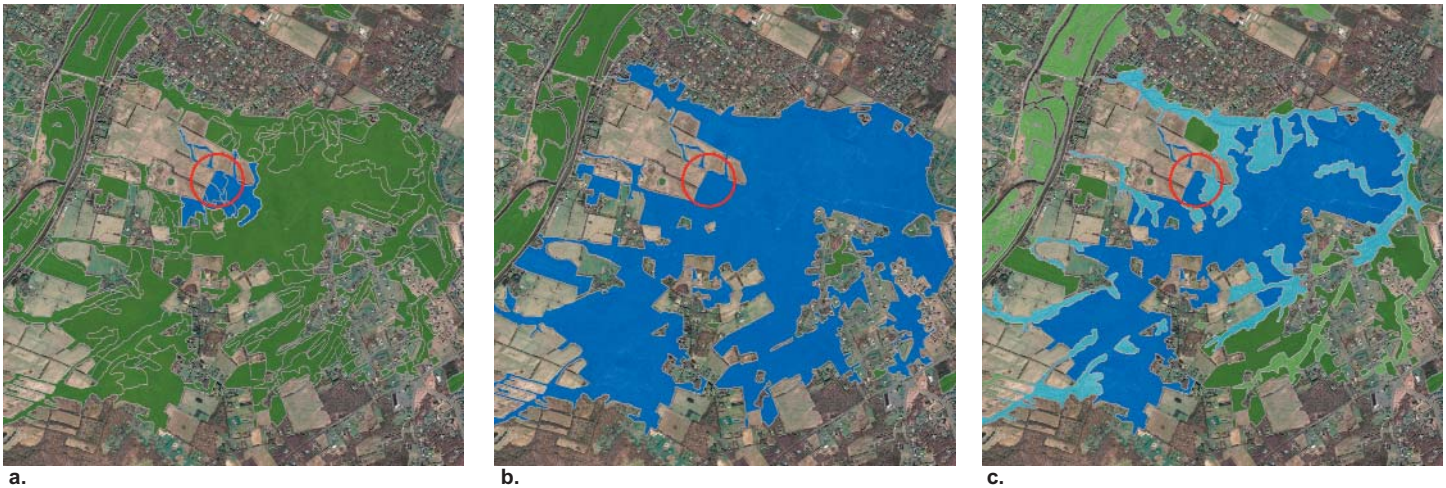
Each species-feature label combination is grouped into one of the following patch type categories.

Limited Extent – polygons from a select set of LULC classes are valued upon intersection with a SOA. Once the valued habitat area is identified, any internal holes or gaps containing polygons of selected LULC classes are also valued if they are completely enclosed by, and contiguous with, the valued area.

Contiguous Area – polygons from a select set of LULC classes are dissolved/combined into contiguous areas and valued upon intersection with a SOA.

Cardinal-Proximate – polygons from an initial, or cardinal, set of LULC classes are valued upon intersection with a SOA and then polygons from a second, proximate set of LULC classes are valued based on a spatial relationship (e.g., adjacency) with polygons from the cardinal set of LULC classes and/or a SOA. Once the valued habitat area is identified, any internal holes or gaps containing polygons of selected LULC classes are also valued if they are completely enclosed by, and contiguous with, the valued area.

Stream Centerline – stream centerlines are valued upon intersection with a SOA. In Version 3.3 of the Landscape Project, only freshwater mussel species utilize the Stream Centerline patch type, described more thoroughly in the next section.



a. b. c.

Examples of patch types. The red circle represents a SOA. Areas depicted in green are LULC polygons that can be valued, while the valued LULC polygons are depicted in blue. a) Limited Extent - LULC polygons that directly intersect the SOA are valued. b) Contiguous Area - LULC polygons are dissolved/combined into contiguous areas and then valued upon intersection with the SOA. c) Cardinal-Proximate - a cardinal set of LULC classes that can be valued is depicted in dark green and dark blue, while a proximate set that can be valued is depicted in light green and light blue. The cardinal LULC polygons are valued upon intersection with the SOA (dark blue) and the proximate set is valued based on adjacency to the valued cardinal set. Valued cardinal LULC polygons are depicted in dark blue, while valued proximate LULC polygons are depicted in light blue.

FRESHWATER MUSSEL HABITAT

DEP maintains a Stream Network data layer that is a subset of the USGS 1:24,000 high-resolution National Hydrography Dataset (NHD). In Version 3.3 of the Landscape Project, stream and water body centerlines from the NHD Streams 2002 data layer are used to represent freshwater mussel habitat.

The Eastern Pondmussel (Threatened) can be found in the lower half of the Delaware River and several of its tributaries.

Water body centerline and stream centerline data are valued exclusively by freshwater mussel species occurrence areas while other aquatic species habitats are represented with polygons from the Species-Based Habitat layer. In order to form representative "patches" of habitat from the NHD Streams 2002 layer, centerlines were broken at the confluence of two or more streams or the inflow/outflow of a water body.

Stretches of stream intersected by a mussel SOA are valued as habitat. All valued streams are buffered by 0.75 kilometers upstream and downstream. The 0.75 kilometer distance is chosen as a conservative buffer estimate because scientific literature based largely upon larval transport by host fishes, indicates that if there are two occurrences within two kilometers of each other (assuming unsuitable habitat between), these occurrences should be considered as part of the same local population (NatureServe 2011). In the cases where stream buffers of separate occurrences of the same species meet, either upstream or downstream, the stream segments between those occurrences are also valued for that species. In addition, in cases where dams are barriers the extent of stream valued was limited.

The tidewaters of Pompeston Creek in Burlington County provide ideal habitat for the Eastern Pondmussel.

Stream centerlines are used to represent freshwater mussel habitat in Version 3.3 of the Landscape Project.

VERNAL HABITAT

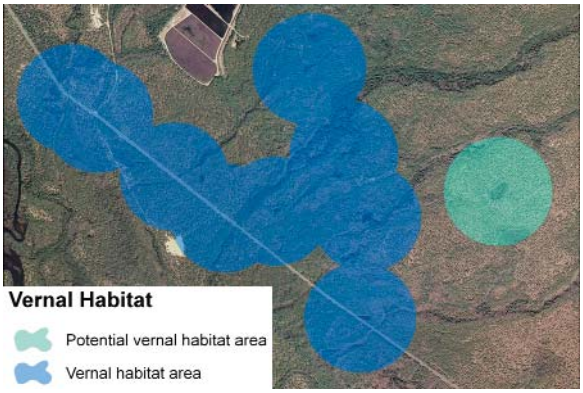
In 2001, ENSP partnered with Rutgers University Center for Remote Sensing and Spatial Analysis (CRSSA) to develop a method for mapping potential vernal pools throughout New Jersey. Through an on-screen visual interpretation of digital orthophotography, CRSSA identified over 13,000 potential pools throughout the state. A subset of these pools was field verified and confirmed, with an 88% accuracy rate, to meet the physical characteristics to qualify as a vernal pool (Lathrop et al. 2005).

Eastern Tiger Salamander (Endangered), a vernal pool breeder.

In accordance with N.J.A.C. 7:7A-1.4, the term "vernal habitat" includes a vernal pool - or the area of ponding - plus any freshwater wetlands adjacent to the vernal pool. Vernal habitat areas mapped in the Landscape Project rely upon those data developed by the DEP and CRSSA to identify sites that should be field checked for possible identification as vernal habitat areas. DEP staff is in the process of field-verifying these pools. The Department also maps vernal habitat areas based upon on-the-ground assessment of sites not captured by the CRSSA mapping. The Landscape Project includes all of the CRSAA-identified sites, as well as sites identified by on-the-ground reconnaissance, categorized as either "potential vernal habitat areas" or "vernal habitat areas" as defined below.

- **Potential vernal habitat area** - These are areas identified by CRSSA as possibly containing a vernal pool that meets the criteria of a "vernal habitat" pursuant to N.J.A.C. 7:7A-1.4. These sites include sites that have been field inspected and have been found to meet the physical characteristics of a vernal habitat, but for which biological criteria have not yet been measured, as well as sites that have not been checked by DEP staff.
- **Vernal habitat areas** - These are areas that contain pools that have been field-verified by the Department and have been determined to meet both the physical and biological characteristics of a vernal habitat in accordance with N.J.A.C. 7:7A-1.4.

A vernal pond in northern New Jersey.



Vernal habitat areas identified in the Landscape Project.

All areas mapped as "potential vernal habitat areas" and "vernal habitat areas" are derived from a point location estimated to be the center of an individual vernal pool and include all areas within 300 meters of the point. Note that the occurrence area is not intended to suggest or correspond with any specific regulatory requirement. Rather, the area added around the point accounts for variations in the size of individual vernal pools, variations in the width of freshwater wetlands adjacent to the pool, plus adjacent habitats sufficient to include the estimated home range for vernal pool obligate species. If there is an overlap between areas mapped around two or more nearby points, the boundaries are conjoined to generate contiguous patches. If the resulting patch contains areas mapped as "vernal habitat area" and areas mapped as "potential vernal habitat areas," the entire patch is labeled as a "vernal habitat area."

DATA AVAILABILITY

Landscape Project maps are available in file geodatabase format and projected to New Jersey State Plane feet, datum NAD 83, zone 4701. The maps are best viewed using ArcGIS 10.x. These software products allow the user full functionality for viewing and manipulating Landscape Project data. Non-GIS users can view the maps using the DEP's interactive mapping application listed below or ArcGIS Explorer, a free GIS data browser that can be downloaded from the ESRI Web site: http://www.esri.com/software/arcgis/explorer/index.html

Landscape Project data and maps are available by the following methods:

GIS Data

- Download on NJDEP's Bureau of GIS website (http://www.nj.gov/dep/gis).

Online Mapping Application

- Access GIS layers on NJDEP's interactive mapping application site (http://www.nj.gov/dep/gis/).

For more information, contact:

New Jersey's Landscape Project
Department of Environmental Protection
Division of Fish and Wildlife
Endangered and Nongame Species Program
Mail Code 501-03
P.O. Box 420
Trenton, NJ 08625-0420
Phone: (609) 292-9400
Fax: (609) 984-1414

LITERATURE CITED

Anderson, J.R., E.E. Hardy, J.T. Roach, and R.E. Witmer. 1976. *A land use and land cover classification system for use with remote sensor data.* U.S. Geological Survey Professional Paper 964. 28 p.

Fahrig, L., and T. Rytwinski. 2009. Effects of roads on animal abundance: an empirical review and synthesis. Ecology and Society 14(1): 21.

Hasse, J., and R. G. Lathrop. 2010. *Changing Landscapes in the Garden State: Urban Growth and Open Space Loss in New Jersey 1986 thru 2007*. Glassboro, NJ: Rowan University, Geospatial Research Lab. Retrieved from http://gis.rowan.edu/projects/lulc/

Hasse, J. and R. G. Lathrop. 2008. *Tracking New Jersey's Dynamic Landscape: Urban Growth and Open Space Loss 1986-1995-2002*. Glassboro, NJ: Rowan University, Geospatial Research Lab. Retrieved from http://www.crssa.rutgers.edu/projects/lc/urbangrowth/index.html

Hasse, J, and R.G. Lathrop. 2001. *Measuring urban growth in New Jersey. A report on recent land development patterns utilizing the 1986-1995 NJ DEP Land Use/Land Cover Dataset.* Center for Remote Sensing and Spatial Analysis. Rutgers University.

Hasse, J., J. Reiser, and A. Pichacz. 2010. *Evidence of Persistent Exclusionary Effects of Land Use Policy with Historic and Projected Development Patterns in New Jersey: A Case Study of Monmouth and Somerset Counties.* Glassboro, NJ: Rowan University, Geospatial Research Lab. Retrieved from http://gis.rowan.edu/labprojects/exclusionary/

Hughes, M., and R. G. Lathrop. 2001. *A Methodology for Defining and Characterizing the Health of Riparian Areas in the Musconetcong and Pohatcong Watersheds using Geographic Information Systems.* Rutgers University Grant F. Walton Center for Remote Sensing and Spatial Analysis. CRSSA Technical Report 0101.

Lathrop, R.G., P. Montesano, J. Tesauro, and B. Zarate. 2005. *Statewide mapping and assessment of vernal pools: A New Jersey case study*. Journal of Environmental Management 76: 230-238.

NatureServe. 2011. NatureServe Explorer: An online encyclopedia of life (web application). Version 7.1. NatureServe, Arlington, VA. Accessed: August 25, 2011 from http://www.natureserve.org/explorer

Seiler, A. 2003. The toll of the automobile: wildlife and roads in Sweden. Dissertation, Swedish University of Agricultural Sciences, Uppsala, Sweden.

U.S. Department of the Interior, Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau. 2006. *2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation*.

GIS DATA SOURCES

NJ Department of Environmental Protection (NJDEP), Office of Information Resources Management (OIRM), Bureau of Geographic Information Systems (BGIS). 2015. NJDEP 2012 Land use/Land cover Update.

Online Linkage: http://www.nj.gov/dep/gis/lulc12.html

New Jersey Department of Environmental Protection (NJDEP), Office of Information Resources Management (OIRM), Bureau of Geographic Information Systems (BGIS). 2010. National Hydrography Dataset (NHD) Streams 2002.

Online Linkage: http://www.nj.gov/dep/gis/nhd2002.html

New Jersey Department of Environmental Protection (NJDEP), Division of Fish and Wildlife (DFW), Endangered and Nongame Species Program (ENSP) and Rutgers University Center for Remote Sensing and Spatial Analysis (CRSSA). 2006. Potential Vernal Pools.

Online Linkage: http://www.dbcrssa.rutgers.edu/ims/vernal/index.html

New Jersey Department of Environmental Protection (NJDEP), Division of Fish and Wildlife (DFW), Endangered and Nongame Species Program (ENSP). 2016. Species Occurrence Areas, Version 11.

Online Linkage: Unpublished.

New Jersey Department of Environmental Protection (NJDEP). New Jersey Integrated Terrain Unit Maps (ITUM) Flood Prone Areas.

Online Linkage: http://www.epa.gov/region2/gis/atlas/fld_itum.htm

New Jersey Department of Transportation (DOT), Geographic Information Systems. NJDOT Major Roadways 2015.

Online Linkage: http://www.state.nj.us/transportation/gis/map.shtm

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Soil Survey Geographic (SSURGO) Database. Accessed [06/01/2015].

Online Linkage: https://sdmdataaccess.sc.egov.usda.gov.

United States Department of Homeland Security, Federal Emergency Management Agency (FEMA), Flood Map Service Center. 2015.

Online Linkage: https://msc.fema.gov/portal

GLOSSARY

Biological and Conservation Database (BCD) - Biodiversity data management software developed by NatureServe that was formerly used by the New Jersey Department of Environmental Protection's Natural Heritage Program and Division of Fish and Wildlife's Endangered and Nongame Species Program before it was replaced by Biotics in 2004.

Biotics - Biodiversity data management software used by the Endangered and Nongame Species Program (ENSP). The successor to the Biological and Conservation Database, this data management software is developed by NatureServe and, within New Jersey, is maintained jointly by ENSP (animal data) and the Natural Heritage Program (plant and ecological community data).

certified vernal pool - Four criteria must be satisfied in order for a vernal pool to be classified as certified. These criteria are: 1. The area must occur in a confined basin or depression without a permanently flowing outlet; 2. The pool must feature evidence of breeding by at least one obligate or two facultative vernal habitat species (these species are identified in N.J.A.C. 7:7A, Appendix 1); 3. The area must maintain ponded water for at least two continuous months between March and September of a normal rainfall year, and; 4. The area must remain free of fish populations throughout the year, or it must dry up at some time during a normal rainfall year.

endangered species - A species included on the list of endangered species at N.J.A.C. 7:25-4.13 and any species or subspecies of wildlife appearing on any Federal endangered species list. The Endangered and Nongame Species Conservation Act (N.J.S.A. 23:2A et seq.) defines an endangered species (with respect to wildlife) to be a species or subspecies of wildlife whose prospects for survival or recruitment are in jeopardy or are likely within the foreseeable future to become so due to any of the following factors: (1) the destruction, drastic modification, or severe curtailment of its habitat, or (2) its over-utilization for scientific, commercial or sporting purposes, or (3) the effect on it of disease, pollution, or predation, or (4) other natural or manmade factors affecting its prospects of survival or recruitment within the State, or (5) any combination of the foregoing factors. The term shall also be deemed to include any species or subspecies of wildlife appearing on any Federal endangered species list.

feature label - A label assigned to each occurrence that describes the occurrence type (e.g., nest, den, dead on road, etc.).

Highlands Region - The New Jersey Highlands Region is the area designated pursuant to the Highlands Water Protection and Planning Act, at N.J.S.A. 13:20-7; an over 800,000 acre region covering over 1,250 square miles and 88 municipalities in seven counties (Bergen, Hunterdon, Morris, Passaic, Somerset, Sussex and Warren). The Highlands Region is an essential source of drinking water for half of the residents of New Jersey.

imperiled species - Includes all wildlife species considered to be endangered or threatened as defined elsewhere in this document.

location use class - A label used for aerial and marine migrants that occupy disjunct locations by season (i.e. breeding or nonbreeding). Applies to migratory species only.

Land Use/Land Cover (LULC) - A geographic information system (GIS) dataset produced by visually interpreting color infrared aerial photography of New Jersey. Through this process, photo-interpreters examine each

image, and based on their knowledge of photo signatures, classify the image into various land use/ land cover categories. The classifications are converted into a land use/land cover GIS digital file, with each delineated polygon representing a distinct land use/land cover type.

LULC treatment - A specific rule applied to an individual LULC class that determines how that LULC class will interact with a SOA and/or other LULC classes in order to construct patches of habitat for each species-feature label combination.

major roadway - A roadway classified by the New Jersey Department of Transportation as a 600 Series County Route or higher. Major roadways are Interstate Highways, U.S. Routes, NJ State Highways, Toll Authority Routes and 500 and 600 Series County Routes.

Natural Heritage methodology - A set of standard procedures for gathering, organizing, and managing information on biodiversity, used throughout the NatureServe network.

NatureServe - A non-profit conservation organization that provides scientific information and tools to help guide effective conservation action. NatureServe represents an international network of biological inventories (known as natural heritage programs or conservation data centers) operating in all 50 states, Canada, Latin America, and the Caribbean.

patch type - A category that describes the method employed to form the valued habitat area from the Landscape base layer for each species-feature label combination. Each species-feature label combination is grouped into one of the patch type categories.

riparian - Of, or pertaining to, the bank of a river or stream.

Rutgers University Center for Remote Sensing and Spatial Analysis (CRSSA) - An active research and development program focusing on advancing the application of various geo-spatial technologies including remote sensing, geographic information systems and global positioning systems. CRSSA also develops spatial-statistical analysis/modeling techniques for the environmental, agricultural and natural resource sciences and management.

species occurrence area - A polygon specific to each species-feature label combination that is applied to all occurrences in the Biotics database and that is used to value habitat in the Landscape Project. The area of the polygon is generally based on the average home range/territory size, or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from information obtained through ENSP research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in New Jersey. For many species that value habitat patches in the Landscape Project maps, insufficient information exists in the scientific literature to support the designation of an occurrence area. In these cases, a default occurrence area (71.25m radius) is applied to take into account locational uncertainty.

species of special concern - Nongame wildlife species that warrants special attention by the Department because of inherent vulnerability to environmental deterioration or habitat modification that would result in its becoming threatened if conditions surrounding the species begin or continue to deteriorate. Factors that can lead to classification as special concern include, but are not limited to, species rarity in the State, highly specialized food and/or habitat requirements, low reproductive rate, isolated populations of the species within the State

and/or other characteristics that make the species particularly susceptible to environmental or habitat changes. This category includes a species that meets the foregoing criteria and for which there is little understanding of its current population status in the State. Species determined to be "special concern" are so-designated at N.J.A.C. 7:25-4.17.

threatened species - An indigenous nongame wildlife species of New Jersey designated pursuant to the Endangered and Nongame Species Conservation Act, N.J.S.A.23:2A et. seq., and its implementing rules, N.J.A.C. 7:25-4.17, as most recently amended. Threatened species are generally defined to be species that may become endangered if conditions surrounding them begin or continue to deteriorate.

vernal pool - Vernal pools are confined depressions, either natural or man-made, that hold water for at least two consecutive months out of the year, and are devoid of breeding fish populations. Vernal pools provide habitat to many species of amphibians, insects, reptiles, plants, and other wildlife. The absence of fish is the essence of these ecosystems.

Geographic Information Systems Terminology from Environmental Systems Research Institute's Online GIS Dictionary (http://support.esri.com/index.cfm?fa=knowledgebase.gisDictionary.gateway)

ArcView - Full-featured geographic information system software for visualizing, analyzing, creating, and managing data with a geographic component.

ArcView Shapefile - A vector data storage format for storing the location, shape, and attributes of geographic features. A shapefile is stored in a set of related files and contains one feature class.

dissolve - A geoprocessing command that removes boundaries between adjacent polygons that have the same value for a specified attribute.

feature class - In ArcGIS, a collection of geographic features with the same geometry type (such as point, line, or polygon), the same attributes, and the same spatial reference. Feature classes can be stored in geodatabases, shapefiles, coverages, or other data formats. Feature classes allow homogeneous features to be grouped into a single unit for data storage purposes.

feature dataset - In ArcGIS, a collection of feature classes stored together that share the same spatial reference; that is, they share a coordinate system, and their features fall within a common geographic area. Feature classes with different geometry types may be stored in a feature dataset.

geodatabase - A database or file structure used primarily to store, query, and manipulate spatial data. Geodatabases store geometry, a spatial reference system, attributes, and behavioral rules for data. Various types of geographic datasets can be collected within a geodatabase, including feature classes, attribute tables, raster datasets, network datasets, topologies, and many others.

geoprocessing - A geographic information system (GIS) operation used to manipulate GIS data. A typical geoprocessing operation takes an input dataset, performs an operation on that dataset, and returns the result of the operation as an output dataset. Common geoprocessing operations include geographic feature overlay, feature selection and analysis, topology processing, raster processing, and data conversion. Geoprocessing allows for definition, management, and analysis of information used to form decisions.

GIS - Acronym for geographic information system. An integrated collection of computer software and data used to view and manage information about geographic places, analyze spatial relationships, and model spatial processes. A GIS provides a framework for gathering and organizing spatial data and related information so that it can be displayed and analyzed.

GPS - Acronym for Global Positioning System. A system of radio-emitting and –receiving satellites used for determining positions on the earth. The orbiting satellites transmit signals that allow a GPS receiver anywhere on earth to calculate its own location through trilateration. Developed and operated by the U.S. Department of Defense, the system is used in navigation, mapping, surveying, and other applications in which precise positioning is necessary.

raster - A spatial data model that defines space as an array of equally sized cells arranged in rows and columns, and comprised of single or multiple bands. Each cell contains an attribute value and location coordinates. Unlike a vector structure, which stores coordinates explicitly, raster coordinates are contained in the ordering of the matrix. Groups of cells that share the same value represent the same type of geographic feature.

union - A topological overlay of two or more polygon spatial datasets that preserves the features that fall within the spatial extent of either input dataset; that is, all features from both datasets are retained and extracted into a new polygon dataset.

vector - A coordinate-based data model that represents geographic features as points, lines, and polygons. Each point feature is represented as a single coordinate pair, while line and polygon features are represented as ordered lists of vertices. Attributes are associated with each vector feature, as opposed to a raster data model, which associates attributes with grid cells.

CONVERSIONS

Area:

1 hectare = 2.47 acres

Distance:

1 meter = 3.28 feet

1 kilometer = 0.62 miles

PHOTO CREDITS

Allen Barlow: page 5 top right, 24 top. **Jeanette Bowers-Altman**: page 24 bottom. **©Hal Brundage, ERC Inc.:** cover row 5 (3). **©George Cevera**: page 17 bottom right. **Kathy Clark**: cover row 1 (6), row 2 (4), row 4 (1,3,4), row 5 (1,4,5,7), page 3, 4 top right, 13, 15 top. **Heather Corbett**: page 5 bottom left. **Dey:** cover row 3 (6). **Michael Davenport**: cover row 1 (5), row 2 (5), page 16 bottom. **Christina Davis**: page 5 top left, 14. **Daniel Ferrigno**: page 15 bottom. **David Golden**: cover row 3 (1), row 5 (2,6), page 16 top, 18 right. **MacKenzie Hall**: cover row 3 (2), page 5 bottom right, page 11. **New Jersey Conservation Foundation**: page 10. **Robert Somes**: cover row 2 (1), row 3 (5), page 16 middle. **Ben Trotter:** cover row 3 (4). **Mick Valent:** cover row 2 (2). **Melissa Woerner**: cover row 2 (3), page 18 left. **Ben Wurst**: cover row 1 (4), page 9. **Brian Zarate**: cover row 1 (1-3), row 3 (3), row 4 (2,5), page 17 top left, 20, 25.

MAP CREDITS

Unless noted below all maps created by: **Patrick Woerner, Brian Henderson, Pete Winkler, William Pitts and Melanie Mason**.

Amy S. Greene Environmental Consultants, Inc.: page 8.
Kingwood Township/Kratzer Environmental Services, Inc.: page 12.
New Jersey Conservation Foundation: page 10.

APPENDICES (Available Online Only)

Appendix I. Protocol for Accepting or Rejecting Species Sighting Reports.

http://www.state.nj.us/dep/fgw/ensp/landscape/appendix_i.pdf

Appendix II. Species Occurrence Area Justifications.

http://www.state.nj.us/dep/fgw/ensp/landscape/appendix_ii.pdf

Appendix III. NJDEP 2012 Land Use/Land Cover Categories.

http://www.state.nj.us/dep/fgw/ensp/landscape/appendix_iii.pdf

Appendix IV. Land Use/Land Cover Analysis for Species and their Feature Label components.

http://www.state.nj.us/dep/fgw/ensp/landscape/appendix_iv.pdf

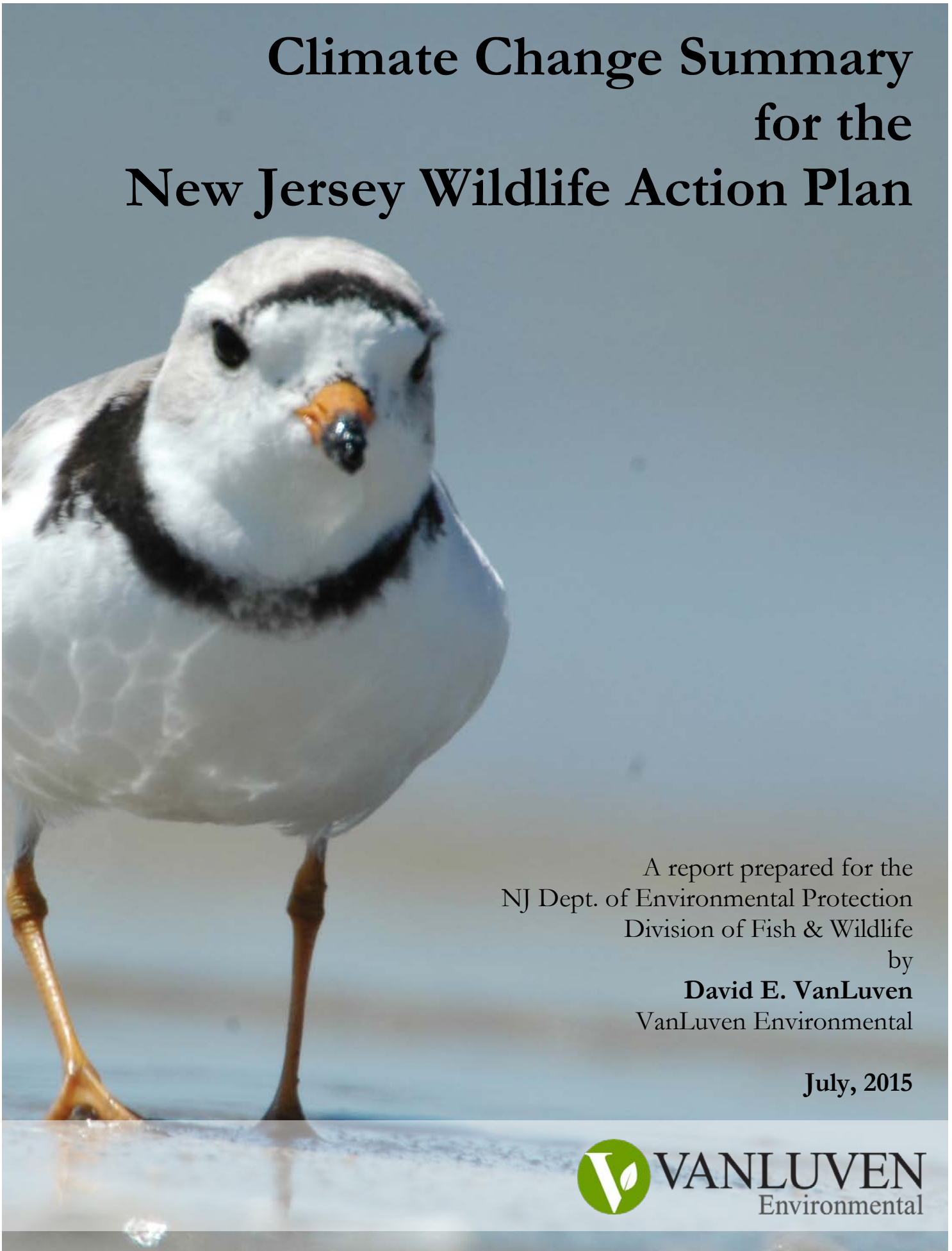
Appendix V. Land Use/Land Cover Selections and Patch Type Justifications.

http://www.state.nj.us/dep/fgw/ensp/landscape/appendix_v.pdf

Bradley Beach
NEPTUNE CITY
Glendola Reservoir
Glendola
Shark River Hills
Avon-by-the-Sea
Shark River Inlet
SHARK RIVER
Neptune
Bradley
BELMAR
West Belmar
South Belmar
Lake Como
Fairview Manor
Spring Lake
SPRING LAKE HEIGHTS
Allenwood
Wreck Pond
Ilansingburg
Sea Girt
MANASQUAN RIVER STATE WILDLIFE MANAGEMENT AREA
MANASQUAN
Sea Girt
Herbertsville
Brielle
MONMOUTH CO. OCEAN CO.
GRAVEL PIT
Riviera Beach
POINT PLEASANT BEACH
Clarks Landing
POINT PLEASANT
ATLANTIC

This page intentionally left blank

Attachment III: Climate Change Summary for the New Jersey Wildlife Action Plan



Climate Change Summary for the New Jersey Wildlife Action Plan

A report prepared for the
NJ Dept. of Environmental Protection
Division of Fish & Wildlife
by

David E. VanLuven
VanLuven Environmental

July, 2015

VANLUVEN
Environmental

EXECUTIVE SUMMARY

Climate change is already underway in New Jersey, and the State Climatologist at Rutgers University has clearly documented increases in average temperatures, fluctuating extremes in precipitation, and sea level rise. These and other climate change impacts are projected to affect New Jersey's wildlife and ecological communities well into the future – exacerbating many long term challenges while presenting new challenges as well.

- Rising sea levels will **inundate intertidal wetlands and beaches**. Extreme storms and storm surge will prompt coastal communities to **further armor coastlines** which can lead to both short- and long-term impacts on coastal habitats and wildlife. **Post-storm replenishment of ocean and estuarine beaches** can deleteriously affect shoreline nesting birds if poorly planned or timed. Higher sea levels will also **push the saltwater toe landward**, making low elevation freshwater wetlands brackish. Excessive groundwater withdrawal could exacerbate this problem.
- Shifting temperatures and altered precipitation patterns will **shuffle species compositions** of ecological communities at the southern edges of their ranges, altering habitat for dependent wildlife species.
- Higher temperatures and altered precipitation patterns could **warm rivers, streams, wetlands, and other aquatic systems**, with deleterious consequences for freshwater mussels, turtles, amphibians, and invertebrates.
- More intense precipitation could cause **more flooding and erosion in streams and rivers**, with a variety of deleterious consequences for fish, mussels, and aquatic invertebrates. In turn, the flooding could motivate landowners within riparian areas to **harden river and stream banks** to protect property and infrastructure, further altering important wildlife habitats.
- Lower water levels in rivers and streams could **impede fish access** to spawning and overwintering areas, and less consistent rainfall into vernal pools could result in drying that eliminates and further isolates these important wildlife habitats. Heavier surface and groundwater withdrawal by humans during droughts could exacerbate these problems.
- Warmer winter temperatures will allow less cold-tolerant species, including problematic **invasives and pathogens**, to expand their ranges into New Jersey, impacting native wildlife and their habitats.

Adapting to climate change doesn't require new strategies, it requires widespread implementation of strategies that have been well known for decades, like maintaining and recreating connectivity between key wildlife habitats.

There is consensus across the scientific community that climate change is happening and recognition that strategies to address its projected impacts on wildlife and their habitats need to be undertaken now. And we know what to do, as the majority of these strategies have been recognized as being necessary for many years regardless of climate change. Further, climate change, with its broad impacts across all sectors of New Jersey interests, could be a catalyst that brings diverse stakeholders with many different motivations together to advance common strategies.

CLIMATE CHANGE & IMPLICATIONS

Climate change is underway in New Jersey, with well documented increases in average temperatures, fluctuating extremes in precipitation, and sea level rise (ONJSC, 2013). A suite of climate change impacts are projected to affect New Jersey's wildlife and ecological communities, exacerbating many long term challenges and presenting new ones. In this chapter, we will briefly consider the relevant elements of climate change on New Jersey's wildlife and ecological communities, identify likely implications, and present potential adaptation strategies.

Temperature

If emissions remain high, average winter temperatures could increase by 8º to 12º F, and summer averages by 6º to 14º F by the end of the century (NCIA, 2006). If emissions are dramatically lowered, winter average temperatures could still warm by 5º to 7.5º F and summer averages by 3º to 7º F (NCIA, 2006).

Implications: Warmer winter temperatures will allow less cold-tolerant invasive species and pathogens to expand their ranges into New Jersey (NCIA, 2006) with deleterious consequences for ecological communities and wildlife. Shifting temperatures across seasons could alter the phenologies of species so they are no longer synchronized – a particular issue for migratory species who may suffer lower reproductive rates as a result (Carey 2009). These temperature changes, combined with altered precipitation patterns, will likely also shift the plant compositions of ecological communities at the edges of their ranges, with comparable shifts in wildlife species (Staudinger *et al.*, 2013).

Higher temperatures, combined with altered precipitation patterns, could further warm rivers and streams, wetlands, and other aquatic systems, making them less suitable for cold water fish, mussels, turtles, amphibians, and invertebrates (Trumbo *et al.*, 2014; Manomet and NWF, 2013a; Brooks, 2009; Hastie *et al.*, 2003; Gibbons *et al.*, 2000). This is especially a concern in waters with marginal temperatures or with isolated populations where cold water fish could be gone by 2030 (Jones *et al.*, 2013). These changes in water temperature, however, are likely to be highly site specific, as key determinants appear to be shading from riparian vegetation, cold water input from springs, surrounding land use, and elevation (Trumbo *et al.*, 2014; Manomet and NWF, 2013a).

Precipitation & Flooding

Winter precipitation totals are projected to increase, while models predict summer totals will remain about the same as we see today (ONJSC, 2013; NCIA, 2006). Precipitation, however, is projected to increasingly come in less frequent but more intense storms (Broccoli *et al.*, 2013; NCIA, 2006).

Implications: More intense precipitation could cause more flooding and erosion in streams and rivers, with a variety of deleterious consequences for fish, mussels, and aquatic invertebrates, from smothering siltation to transport downstream to unsuitable habitats (Manomet and NWF, 2013a; Hastie *et al.*, 2003). In turn, this flooding could motivate landowners within riparian areas to harden shorelines to protect properties and infrastructure, further altering important wildlife habitats.

Drought & Low Stream Flows

Summers in New Jersey are projected to be hotter, with both higher average temperatures and 30 to 60 more days above 90ºF by the end of the century (NCIA, 2006). Higher summer temperatures – combined with steady summer precipitation averages, more rapid evaporation, and more rapid evapotranspiration – will likely lead to more frequent short-term summer droughts and lower stream and river flows in summer (Manomet and NWF, 2013a; ONJSC, 2013; NCIA, 2006).

Implications: Droughts and earlier peak flows could impede migratory fish from reaching spawning areas (Faass *et al.*, 2012). Heavier water withdrawal by humans during droughts could further lower water levels in rivers, streams, and wetlands. Vernal pools are particularly vulnerable to drought and altered precipitation patterns, and the wildlife habitat they provide will change with alterations to their hydroperiods (Brooks 2009). Drying trends will cause some vernal pools to disappear, leaving remaining pools increasingly isolated and less able to support dependent amphibian metapopulations (Brooks 2009).

Sea Level Rise

Records show steady rises in sea level along New Jersey's shores, with an average increase of 1.5 inches per decade at Atlantic City since 1912 (Broccoli, *et al.*, 2013). Climate change will speed this rate – potentially dramatically. Broccoli *et al.* (2013) project increases of 7 to16 inches by 2030 (best estimate = 10 inches), 13 to 28 inches by 2050 (best estimate = 18 inches), and 30 to 71 inches by the end of the century (best estimate = 42 inches). Analyses by Miller *et al*. (2013) project sea levels in 2100 to be 3 to 3.5 feet higher if emissions are lowered, or 5.5 to 6 feet if emissions remain high.

Implications: Higher sea levels will inundate intertidal habitats (notably salt and brackish marshes), estuarine and ocean beaches, and low-lying freshwater wetlands and streams. If these ecological communities are able to migrate landward, they and the important wildlife habitat they provide can persist – especially if the rates of sea level rise are lower and there is sufficient sediment for intertidal wetlands to accrete on pace with the rising waters (NWF and Manomet, 2014; Hartig *et al.*, 2002). However, more intense storms and storm surge will trigger additional shoreline armoring, as was observed after Hurricane Sandy, thus making inland migration nearly impossible. NWF and Manomet (2014) project that ocean and estuary beaches will be reduced between 20% and 75% through the century, and salt marshes by 45% to 65%, depending on rates of sea level rise. Inundated and eroded salt marshes would likely be replaced by intertidal flats, providing a benefit for migratory shorebirds and waterfowl that depend on these habitats (NWF and Manomet, 2014) but a sharp decline in nesting habitat for wading birds, terns, gulls and other species that breed in salt marshes. Other researchers give more dire predictions, with one predicting that 89% of New Jersey's salt marshes will disappear with a 1-foot rise in sea level, and 95% being inundated with a 3-foot rise (Faass *et al.*, 2015).

Sea level rise will also increase saltwater intrusion into inland freshwater systems. Low-lying river and stream reaches will become tidal and brackish, and the ecological communities and wildlife they support will transition accordingly (Najjar *et al.*, 2000). The underground saltwater toe will also shift landward, making low elevation freshwater wetlands brackish, especially if accompanied by excessive groundwater withdrawal (Werner and Simmons, 2009). This will be particularly damaging to isolated systems, like vernal pools, and the amphibians and bird species that depend on them.

Extreme Storms

The confidence levels for models of tropical cyclone activity are low, leaving it unclear whether New Jersey will experience more frequent extreme storms or if past patterns will continue (Broccoli *et al.*, 2013). One researcher (Miller *et al.*, 2013), however, noted the possibility that by 2050 storms with 10-year recurrence intervals could be more intense than all historic storms that have hit Atlantic City.

Implications: Storm surge will inundate higher elevations due to sea level rise. If the frequency of damaging storm surge increases, then coastal communities will likely undertake more aggressive shoreline armoring to protect imperiled or damaged properties and infrastructure (Berry *et al.*, 2013). This armoring, in turn, could create a sense of safety in shoreline communities and stimulate further coastal development (Franck, 2009). This additional

shoreline hardening and development would exacerbate the impacts of sea level rise on intertidal habitats and beaches by further impeding their ability to migrate landward – a process that is already a severe challenge with development along 67% of New Jersey's sandy oceanfront and 59% of these beaches armored with hard stabilization structures (Rice, 2015).

Severe storms can benefit wildlife, with new overwashes and inlets creating ideal foraging and breeding habitat for species like piping plover. These benefits can be rapidly undone, however, by post-storm management that closes new inlets and seals dune breaches. Further, post-storm replenishment of ocean and estuarine beaches can also deleteriously affect shoreline nesting birds if not carefully planned and timed.

Human Responses to Climate Change

As noted above, human responses to climate change can present serious challenges for wildlife and ecological communities in New Jersey (Manomet and NWF, 2013b; Faass *et al.*, 2012). For example, more variable precipitation patterns are projected to deliver more protracted periods of drought. During these times, municipalities may draw more heavily on surface and groundwater to supply clean water for drinking, watering lawns, and other purposes. These withdrawals could have a variety of implications for New Jersey wildlife, from lower stream flows that impede the movement of migratory fish to less seepage that alters wetlands vital for wildlife species of greatest conservation need. In another example, the typical response to flooding along the coast is to harden shorelines (Berry *et al.*, 2013), which can increase erosion and impede the ability of coastal habitats, and subsequently, coastal-dependent wildlife, to migrate landward with sea level rise. As such, adapting to climate change requires strategies not only that address climate challenges, but that also account for human responses to climate change.

TAKING ACTION DESPITE UNCERTAINTY

One of the biggest difficulties climate change presents to wildlife managers is uncertainty (Trumbo *et al.*, 2014). We can see climate change happening around us and know that it will continue. Across North America, researchers are recording rising sea levels, earlier or later fish and bird migrations, earlier peak flows in rivers and streams, and a northward expansion of pests (Manomet and NWF, 2013b; ONJSC, 2013). However, the magnitude of climate change over the next 80 to 100 years is unclear, and in turn the consequences of it are uncertain as well. For example, sea level in New Jersey is projected to rise by about 3 feet if emissions are lowered dramatically and by about 6 feet if emissions remain high (Miller *et al.*, 2013). Salt marshes may be able to accrete on pace with the low-emission rate of sea level rise with adequate deposition of sediments and reductions in non-climate change threats like pollution and shoreline hardening (NWF and Manomet, 2014). They are, however, unlikely to accrete on pace with the high-emission rate, which means their persistence will largely rely on the availability of adjacent uplands to convert to salt marsh habitat. So for which scenario should wildlife managers plan?

The answer is both, or rather, decision-makers should pursue climate change adaptation strategies that will yield benefits across a range of climate change scenarios (Staudinger *et al.*, 2015; The Nature Conservancy, 2009). Since we don't know exactly what the future will hold, we should advance strategies that are most likely to yield benefits regardless of what happens.

This raises the additional challenge of moving forward on actions – some of which would be financially or politically costly – without a clear guarantee that they will be successful. Wildlife management has long worked in a world of incomplete information, as the data ideal for decision making (e.g., population sizes, habitat requirements, and in some cases even life histories) are not always available. But climate change exacerbates this difficulty by introducing variability in

parameters that have historically been considered relatively stable (e.g., average seasonal temperatures, precipitation patterns, etc.).

Not only is there consensus across the scientific community that climate change is happening, there is recognition that strategies to address its projected impacts on wildlife and their habitats need to be undertaken now (Staudinger *et al.*, 2015). And we know what to do, as the majority of these strategies have been recognized as being necessary for many years regardless of climate change. Further, climate change, with its broad impacts across all sectors of New Jersey interests, could be a catalyst that brings diverse stakeholders with many different motivations together to advance common strategies (The Nature Conservancy, 2009).

OLD THREATS REMAIN

Climate change is affecting wildlife habitats and ecological communities in New Jersey with more rapidly rising sea levels, more variable precipitation patterns, higher temperatures, and more. In addition to direct impacts, climate change is interacting with other stressors like habitat destruction, pollution, invasive species, off-road vehicle use, and an overabundance of white-tailed deer to deleteriously affect New Jersey's wildlife and ecological communities (Johnson and Strakosch Walz, 2013; Manomet and NWF, 2013b; Staudinger *et al.*, 2013; Faass *et al.*, 2012). As adaptation strategies are developed, wildlife managers need to continue addressing these serious threats as well, incorporating approaches that address multiple issues whenever possible.

MULTIPLE APPROACHES TO ADAPTATION

Wildlife conservation planning has typically focused on maintaining existing conditions that will allow local populations to persist in healthy sites that are able to rebound after local disturbances (Stein *et al.*, 2013; Staudinger *et al.*, 2015). Unfortunately, the challenges created and exacerbated by climate change may make the goals of this approach infeasible as altered precipitation patterns, higher temperatures, and other factors lead to fundamental changes in the landscape and at local sites. As a result, managers need to consider conservation goals that manage change in addition to maintaining existing conditions (Staudinger *et al.*, 2013; Stein *et al.*, 2013).

This shift in perspective is further developed in the two approaches to adaptation that are briefly outlined below. Both approaches have similar intents of protecting healthy ecological communities and wildlife populations that can rebound from perturbations while supporting a diversity of native species. But while one approach focuses on the persistence of *current* ecological communities and species in particular places, the other focuses on the geophysical conditions that underlie *future* species richness.

<u>Current Species and Ecological Communities</u>

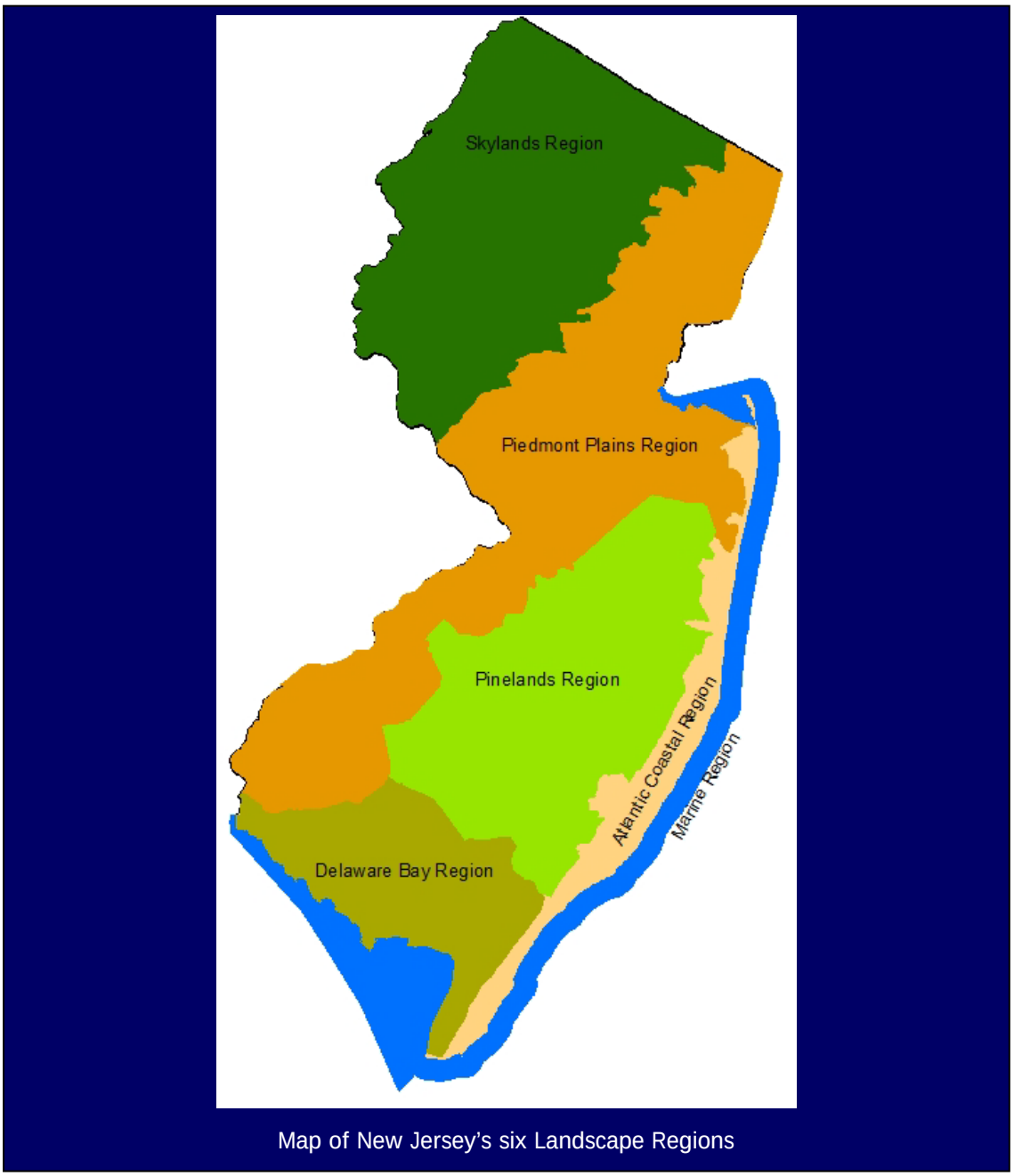
This approach is the most common one seen across the United States. It focuses on the factors that affect a species' or habitat's vulnerability to climate change and strives to implement strategies that will overcome these challenges to ensure the species' or habitat's persistence. This includes approaches referred to as "resistance" and "resilience." Key elements include increasing connectivity between protected areas and other refugia, and sustaining ecological processes and functions (Staudinger *et al.*, 2015). While this approach recognizes that there will be major changes across the state, the emphasis is on protecting the species and the habitats that are in New Jersey now.

Geophysical Foundations of Future Species and Ecological Communities

This approach was developed by Anderson and Ferree (2010) and focuses on protecting places with the geophysical features (including geology, topography, elevation, and moisture gradients) that are most likely to support species richness regardless of climate change (Anderson *et al.*, 2011). Because the focus is on the abiotic features that support biodiversity, this approach may not prevent immediate local extinctions (Anderson and Ferree, 2010), a particular risk for species living at the extremes of their climactic tolerances or within habitats that are expected to experience major changes (Staudinger *et al.*, 2013).

LANDSCAPE REGIONS

New Jersey has six landscape regions which contain similar ecological communities and processes (NJ Division of Fish and Wildlife, 2012). Brief descriptions of these regions, concise notes on primary climate change threats, and potential adaptation strategies are provided below.



Map of New Jersey's six Landscape Regions

DELAWARE BAY LANDSCAPE REGION

Description

This landscape encompasses all or parts of Cape May, Atlantic, and Cumberland counties. It features significant populations of bald eagle, barred owl, eastern tiger salamander, and Cope's gray treefrog, and. It also provides habitat for 30 other endangered and threatened species. The vast woodland tracts of this region are among the largest in the state and support a large portion of New Jersey's neotropical birds and interior-forest bird populations. The extensive saltwater marshes and sandy overwash beaches support a significant horseshoe crab breeding area and migrating shorebirds including the red knot, a species of worldwide ecological significance. The expansive habitat mosaic of rivers and streams flowing into the tidal Delaware Bay supports concentrations of wildlife species of greatest conservation need and wintering waterfowl. Despite the heavy loss of habitat, the Cape May Peninsula remains one of the country's most important migratory "stopovers" for hundreds of bird, bat, and insect species. The peninsula's habitats, however, have been degraded by continuing development and invasions of exotic vegetation that crowd out native plants. The loss of peninsula habitat is a significant threat to migratory birds and to other species that reside permanently in this limited area. The region has many interior forests in conservation ownership, but forest management approaches do not necessarily secure the future for many wildlife species of conservation greatest conservation need. The largest threat to the region's habitats is the continuing conversion of habitat to development that fragments the remaining natural landscape.

Primary Climate Change Threats & Adaptation Strategies

- Rising sea levels will **inundate intertidal wetlands and beaches**. Extreme storms and storm surge will prompt coastal communities to **further armor coastlines** which can lead to both short- and long-term impacts on coastal habitats and wildlife. **Post-storm replenishment of estuarine beaches** can deleteriously affect shoreline nesting birds if poorly planned or timed. Higher sea levels will also **push the saltwater toe landward**, making low elevation freshwater wetlands brackish. **Excessive groundwater withdrawal** could exacerbate this problem.
  Strategies:
  - limit coastline hardening and development to allow beaches and intertidal wetlands to migrate landward
  - implement dune protection policies that protect dunes and ensure space for landward migration
  - integrate wildlife conservation into beach replenishment programs to minimize deleterious effects on nesting shorebirds
  - implement groundwater withdrawal policies that account for saltwater intrusion

- Shifting temperatures and altered precipitation patterns will **shuffle species compositions** of ecological communities at the southern edges of their ranges, altering habitat for dependent wildlife species.
  Strategy:
  - undertake site-specific and landscape-level programs to maintain and recreate connectivity between key habitats and areas of high geophysical diversity

- Higher temperatures and altered precipitation patterns could **warm rivers, streams, wetlands, and other aquatic systems**, with deleterious consequences for freshwater mussels, turtles, amphibians, and invertebrates.
  Strategies:
  - maintain and restore riparian vegetation to increase shading
  - limit and remove impervious surfaces near waterways to reduce their warming effect on runoff

  - during droughts, limit water withdrawal that could reduce input of cold groundwater

- More intense precipitation could cause **more flooding and erosion in streams and rivers**, with a variety of deleterious consequences for fish, mussels, and aquatic invertebrates. In turn, the flooding could motivate landowners within riparian areas to **harden river and stream banks** to protect property and infrastructure, further altering important wildlife habitats.
  Strategies:
  - maintain and restore floodplains and wetlands to slow runoff
  - guide development away from flood-prone areas
  - limit river and stream bank hardening
  - integrate more intense precipitation and flooding considerations into soil erosion and sediment control best management practices

- Lower water levels in rivers and streams could **impede fish access** to spawning and overwintering areas, and less consistent rainfall into vernal pools could result in drying that eliminates and further isolates these important wildlife habitats. Heavier surface and groundwater withdrawal by humans during droughts could exacerbate these problems.
  Strategies:
  - implement water conservation strategies during droughts to maintain flows
  - remove barriers that could impede movement during low flows
  - maintain vegetated buffers around vernal pools to increase their resiliency

- Warmer winter temperatures will allow less cold-tolerant species, including problematic **invasives and pathogens**, to expand their ranges into New Jersey, impacting native wildlife and their habitats.
  Strategy:
  - manage sites to limit establishment of invasives and to control their spread

ATLANTIC COASTAL LANDSCAPE REGION

Description

This landscape encompasses parts of Monmouth, Ocean, Cape May, and Atlantic counties. New Jersey's Atlantic Coast beaches and marshes are among the most productive coastal habitats in the country. Despite heavy development, they still support important portions of Atlantic Coast populations of colonial nesting birds, such as common tern, little blue heron, and great egret, and endangered beach-nesting birds such as least tern and piping plover. The coastal habitats also support most of the state's ospreys, peregrine falcons, and northern diamondback terrapins, as well as northern harriers and large concentrations of wintering waterfowl. However, human development has played a large role in degrading the quality of the habitat and there are very few natural areas remaining to support wildlife. By and large, this region has been shaped by the heavy hand of man. Upland portions of the barrier islands are almost entirely developed with residential and commercial properties. Due to this propensity for building permanent structures in a dynamic system, the need to stabilize the islands through extensive use of groins, seawalls, jetties, and intense beach replenishment programs has translated into a reduced ability of the coastal system to function normally. This tug of war is intensified by erosion, which has noticeably affected both the marsh and barrier islands in this landscape, and has diminished the suitability of the landscape for wildlife.

Primary Climate Change Threats & Adaptation Strategies

- Rising sea levels will **inundate intertidal wetlands and beaches**. Extreme storms and storm surge will prompt coastal communities to **further armor coastlines** which can lead to both short- and long-term impacts on coastal habitats and wildlife. **Post-storm replenishment of estuarine beaches** can deleteriously affect shoreline nesting birds if poorly planned or timed. Higher sea levels will also **push the saltwater toe landward**, making low elevation freshwater wetlands brackish. **Excessive groundwater withdrawal** could exacerbate this problem.
  Strategies:
  - limit coastline hardening and development to allow beaches and intertidal wetlands to migrate landward and undergo other coastal processes (including the development of new inlets and overwash areas)
  - educate communities on the benefits of naturally functioning coastal systems that better protect people and important wildlife habitats
  - implement dune protection policies that protect dunes and ensure space for landward migration
  - integrate wildlife conservation into beach replenishment programs to minimize deleterious effects on nesting shorebirds and rare plants
  - implement groundwater withdrawal policies that account for saltwater intrusion

- Shifting temperatures and altered precipitation patterns will **shuffle species compositions** of ecological communities at the southern edges of their ranges, altering habitat for dependent wildlife species.
  Strategy:
  - undertake site-specific and landscape-level programs to maintain and recreate connectivity between key habitats and areas of high geophysical diversity

- Warmer winter temperatures will allow less cold-tolerant species, including problematic **invasives and pathogens**, to expand their ranges into New Jersey, impacting native wildlife and their habitats.
  Strategy:
  - manage sites to limit establishment of invasives and to control their spread

PIEDMONT PLAINS LANDSCAPE REGION

Description

This landscape region combines two of New Jersey's physiographic regions, the Piedmont and the Inner Coastal Plains. It encompasses all or parts of Burlington, Gloucester, Salem, Mercer, Middlesex, Monmouth, Hunterdon, Somerset, Union, Essex, Hudson, Passaic, and Bergen counties. It is dominated by the Delaware and Raritan rivers and is characterized by farmed areas, extensive grasslands, fragmented woodlands, and tidal freshwater marshes that are among the world's most productive. Imperiled species within this landscape include grassland birds such as the endangered upland sandpiper, and it is the only landscape in NJ where the endangered Allegheny woodrat resides. The Piedmont Plains Landscape has been, and continues to be, greatly influenced by human settlement. Most of this region has been logged, farmed, and developed, resulting in contaminated wetlands, fragments of even-aged forest, large fields planted in corn, soybean, or cool-season hay, a plethora of exotic invasive plants, a collection of roads and residential areas, and ideal sanctuaries for white-tailed deer.

Primary Climate Change Threats & Adaptation Strategies

- Shifting temperatures and altered precipitation patterns will **shuffle species compositions** of ecological communities at the southern edges of their ranges, altering habitat for dependent wildlife species.
  Strategy: - undertake site-specific and landscape-level programs to maintain and recreate connectivity between key habitats and areas of high geophysical diversity

- Higher temperatures and altered precipitation patterns could **warm rivers, streams, wetlands, and other aquatic systems**, with deleterious consequences for freshwater mussels, turtles, amphibians, and invertebrates.
  Strategies: - maintain and restore riparian vegetation to increase shading
  - limit and remove impervious surfaces near waterways to reduce their warming effect on runoff
  - during droughts, limit water withdrawal that could reduce input of cold groundwater

- More intense precipitation could cause **more flooding and erosion in streams and rivers**, with a variety of deleterious consequences for fish, mussels, and aquatic invertebrates. In turn, the flooding could motivate landowners within riparian areas to **harden river and stream banks** to protect property and infrastructure, further altering important wildlife habitats.
  Strategies: - maintain and restore floodplains and wetlands to slow runoff
  - guide development away from flood-prone areas
  - limit river and stream bank hardening
  - integrate more intense precipitation and flooding considerations into soil erosion and sediment control best management practices

- Lower water levels in rivers and streams could **impede fish access** to spawning and overwintering areas, and less consistent rainfall into vernal pools could result in drying that eliminates and further isolates these important wildlife habitats. Heavier surface and groundwater withdrawal by humans during droughts could exacerbate these problems.
  Strategies: - implement water conservation strategies during droughts to maintain flows
  - remove barriers that could impede movement during low flows
  - maintain vegetated buffers around vernal pools to increase their resiliency

- Warmer winter temperatures will allow less cold-tolerant species, including problematic **invasives and pathogens**, to expand their ranges into New Jersey, impacting native wildlife and their habitats.
  Strategy: - manage sites to limit establishment of invasives and to control their spread

PINELANDS LANDSCAPE REGION

Description

This landscape encompasses all or parts of Atlantic, Ocean, Burlington, Camden, and Gloucester counties. New Jersey's pinelands are an internationally recognized ecosystem consisting predominantly of pine and pine-oak mesic upland forests, pitch pine lowlands, and cedar swamps supporting extremely diverse reptile, amphibian, and invertebrate populations including interior-forest and area-sensitive species. Extensive cedar swamps and wetland systems contain numerous insect species, as well as sustainable populations of many neo-tropical birds. Its waterways support aquatic communities unique among the mid-Atlantic states.

Primary Climate Change Threats & Adaptation Strategies

- Shifting temperatures and altered precipitation patterns will **shuffle species compositions** of ecological communities at the southern edges of their ranges, altering habitat for dependent wildlife species.
  Strategy: - undertake site-specific and landscape-level programs to maintain and recreate connectivity between key habitats and areas of high geophysical diversity

- Higher temperatures and altered precipitation patterns could **warm rivers, streams, wetlands, and other aquatic systems**, with deleterious consequences for freshwater mussels, turtles, amphibians, and invertebrates.
  Strategies: - maintain and restore riparian vegetation to increase shading
  - limit and remove impervious surfaces near waterways to reduce their warming effect on runoff
  - during droughts, limit water withdrawal that could reduce input of cold groundwater

- More intense precipitation could cause **more flooding and erosion in streams and rivers**, with a variety of deleterious consequences for fish, mussels, and aquatic invertebrates. In turn, the flooding could motivate landowners within riparian areas to **harden river and stream banks** to protect property and infrastructure, further altering important wildlife habitats.
  Strategies: - maintain and restore floodplains and wetlands to slow runoff
  - guide development away from flood-prone areas
  - limit river and stream bank hardening
  - integrate more intense precipitation and flooding considerations into soil erosion and sediment control best management practices

- Lower water levels in rivers and streams could **impede fish access** to spawning and overwintering areas, and less consistent rainfall into vernal pools could result in drying that eliminates and further isolates these important wildlife habitats. Heavier surface and groundwater withdrawal by humans during droughts could exacerbate these problems.
  Strategies: - implement water conservation strategies during droughts to maintain flows
  - remove barriers that could impede movement during low flows
  - maintain vegetated buffers around vernal pools to increase their resiliency

- Warmer winter temperatures will allow less cold-tolerant species, including problematic **invasives and pathogens**, to expand their ranges into New Jersey, impacting native wildlife and their habitats.
  Strategy: - manage sites to limit establishment of invasives and to control their spread

SKYLANDS LANDSCAPE REGION

Description

This landscape region combines two of New Jersey's physiographic regions, the Ridge and Valley and the Highlands. It encompasses all or parts of Sussex, Warren, Hunterdon, Somerset, Passaic, Essex, Bergen, and Morris counties. The region contains extensive tracts of contiguous upland and wetland forests that support diverse animal populations including interior-forest and area-sensitive species. Forests on conserved lands suffer from a long-term lack of management and consist more typically of even-aged stands of similar structure. The forest tracts' understories range from a semi-barren landscape of mostly leaf litter and humus due to extensive deer browse and/or a lack of sunlight to an invasive species-dominant (or at least present at significant percentages) ground and shrub cover. Scrub-shrub habitat is minimal and geographically scattered, but is vital to various rare, common, and game wildlife species in this region. The lack of scrub-shrub habitat is also a result of long periods of unmanaged forests, habitat loss to development and infrastructure, and lack of regeneration due to over-browsing by deer.

Primary Climate Change Threats & Adaptation Strategies

- Shifting temperatures and altered precipitation patterns will **shuffle species compositions** of ecological communities at the southern edges of their ranges, altering habitat for dependent wildlife species
  Strategy: - undertake site-specific and landscape-level programs to maintain and recreate connectivity between key habitats and areas of high geophysical diversity

- Higher temperatures and altered precipitation patterns could **warm rivers, streams, wetlands, and other aquatic systems**, with deleterious consequences for freshwater mussels, turtles, amphibians, and invertebrates.
  Strategies: - maintain and restore riparian vegetation to increase shading
  - limit and remove impervious surfaces near waterways to reduce their warming effect on runoff
  - during droughts, limit water withdrawal that could reduce input of cold groundwater

- More intense precipitation could cause **more flooding and erosion in streams and rivers**, with a variety of deleterious consequences for fish, mussels, and aquatic invertebrates. In turn, the flooding could motivate landowners within riparian areas to **harden river and stream banks** to protect property and infrastructure, further altering important wildlife habitats.
  Strategies: - maintain and restore floodplains and wetlands to slow runoff
  - guide development away from flood-prone areas
  - limit river and stream bank hardening
  - integrate more intense precipitation and flooding considerations into soil erosion and sediment control best management practices

- Lower water levels in rivers and streams could **impede fish access** to spawning and overwintering areas, and less consistent rainfall into vernal pools could result in drying that eliminates and further isolates these important wildlife habitats. Heavier surface and groundwater withdrawal by humans during droughts could exacerbate these problems.
  Strategies: - implement water conservation strategies during droughts to maintain flows
  - remove barriers that could impede movement during low flows
  - maintain vegetated buffers around vernal pools to increase their resiliency

- Warmer winter temperatures will allow less cold-tolerant species, including problematic **invasives and pathogens**, to expand their ranges into New Jersey, impacting native wildlife and their habitats.
  Strategy: - manage sites to limit establishment of invasives and to control their spread

MARINE REGION

Description

This region is exclusively aquatic and includes the New Jersey portion of the Delaware and Raritan bays and the Atlantic Ocean within three-nautical miles of the New Jersey shoreline. It supports shellfish of commercial value as well as a variety of fish species of commercial and recreational importance. Over half of New Jersey's federal listed species are found exclusively within this region, including several species of whales and sea turtles. Federally endangered sturgeons (shortnose and Atlantic) can be found in Delaware Bay (with Atlantic sturgeon migrating into ocean areas). Waters of the Delaware Bay are also critical habitat to one of the largest populations of horseshoe crabs in the world. During the summer, near-shore Atlantic Ocean waters are calving and nursery grounds for bottlenose dolphins while many additional species utilize these waters as a migratory corridor.

Threats

The likely responses of ocean ecological systems and marine species to climate change are not well known (Staudinger *et al.*, 2015), and articles tend to consider the issue on a global scale (for example, Kaschner *et al.* (2011) and Herr and Galland, 2009). That said, projected effects include decreased growth and reproduction in some marine fish species, range shifts for species at the northern or southern edges of their ranges, increases in diseases and pathogens, and a "reshuffling" of marine plants and animals (Staudinger *et al.*, 2013).

Adaptation Strategies

While researchers have speculated on potential challenges that climate change poses to marine systems, they have not identified many options that states might take to directly address them. But in a summary report on tools and guidelines for action (Herr and Galland, 2009), the International Union for Conservation of Nature (IUCN) did recommend a variety of strategies, including the following.

Implementing various mitigation activities to reduce the effects of climate change on marine systems by decreasing its magnitude.

Addressing unsustainable human activities, such as overfishing, pollution, and habitat destruction to help keep ocean systems and species more resilient.

Creating networks of Marine Protected Areas to buffer ocean ecosystems from non-climate change challenges and to increase their resiliency.

Restoring degraded ecosystems to make them more resilient. For New Jersey, this would likely be most important in coastal ecological systems that serve, for example, as nurseries for a variety of fish species.

CITATIONS

Anderson, M.G., M. Clark, and A. Olivero Sheldon. 2011. Resilient Sites for Species Conservation in the Northeast and Mid-Atlantic Region. The Nature Conservancy, Eastern Conservation Science, Boston, MA. 122 pp.

Anderson, M.G. and C.E. Ferree. 2010. Conserving the stage: climate change and the geophysical underpinnings of species diversity. PLoS ONE 5(7): e11554.

Berry, A., S. Fahey, and N. Meyers (2013) Changing of the guard: adaptation options that maintain ecologically resilient sandy beach ecosystems. Journal of Coastal Research 29(4): 899-908.

Broccoli, A.J., M. B. Kaplan, P.C. Loikith, and D.A. Robinson. 2013. State of the Climate: New Jersey. Rutgers Climate Institute, Rutgers University, New Brunswick, NJ. 10 pp.

Brooks, R.T. 2009. Potential impacts of global climate change on the hydrology and ecology of ephemeral freshwater systems of the forests of the northeastern United States. Climatic Change 95:469–483.

Carey, C. (2009). The impacts of climate change on the annual cycles of birds. Philosophical Transactions of the Royal Society B: Biological Sciences. 364(1534):3321-3330.

Faass, J.S., V. Truesdale, and J. Herb. 2012. REVISED Malone, S.J. 2015. Preparing New Jersey's Habitats for a Changing Climate: An assessment of vulnerability. A report prepared for the NJ Dept. of Environmental Protection, Division of Fish & Wildlife, Endangered & Nongame Species Program. Environmental Analysis and Communications Group, Edward J. Bloustein School of Planning and Public Policy, Rutgers University, New Brunswick, NJ. 202 pp.

Franck, T., 2009. Coastal adaptation and economic tipping points. Management of Environmental Quality 20(4): 434-450.

Gibbons, J.W., D.E. Scott, T.J. Ryan , K.A. Buhlmann, T.D. Tuberville, B.S. Metts, J.L. Greene, T. Mills, Y. Leiden, S. Poppy, and C.T. Winne. 2000. The global decline of reptiles, déjà vu amphibians. BioScience 50(8): 653-666.

Hartig, E.K,, V. Gornitz, A. Kolker, F. Mushacke, and D. Fallon, D. 2002. Anthropogenic and climate-change impacts on salt marshes of Jamaica Bay, New York City. Wetlands 22(1): 71-89.

Hastie, L.C., P.J. Cosgrove, N. Ellis, and M.J. Gaywood. 2003. The threat of climate change to freshwater pearl mussel populations. Ambio 32(1): 40-46.

Herr, D. and G.R. Galland. 2009. The Ocean and Climate Change: Tools and Guidelines for Action. IUCN, Gland, Switzerland. 72 pp.

Johnson, E. A. and K. Strakosch Walz. 2013. Integrated Management Guidelines for Four Habitats and Associated State Endangered Plants and Wildlife Species of Greatest Conservation Need in the Skylands and Pinelands Landscape Conservation Zones of the New Jersey State Wildlife Action Plan. American Museum of Natural History, Center for Biodiversity and Conservation and New Jersey Department of Environmental Protection, Natural Heritage Program, for NatureServe, Arlington, VA. 149 pp.

Jones, R., C. Travers, C. Rodgers, B. Lazar, E. English, J. Lipton, J. Vogel, K. Strzepek, and J. Martinich. 2013. Climate change impacts of freshwater recreational fishing in the United States. Mitigation and Adaptation Strategies for Global Change 18:731-758.

Kaschner, K, D.P. Tittensor, J. Ready, T. Gerrodette, and B. Worm. 2011. Current and future patterns of global marine mammal biodiversity. PLoS ONE 6(5): e19653.

Manomet Center for Conservation Sciences and the National Wildlife Federation. 2013a. Climate Change and riverine cold water fish habitat in the Northeast: a vulnerability assessment review. A report to the Northeastern Association of Fish and Wildlife Agencies and the North Atlantic Landscape Conservation Cooperative Manomet, Plymouth, MA. 49 pp.

Manomet Center for Conservation Sciences and National Wildlife Federation. 2013b. The Vulnerabilities of Fish and Wildlife Habitats in the Northeast to Climate Change. A report to the Northeastern Association of Fish and Wildlife Agencies and the North Atlantic Landscape Conservation Cooperative. Manomet, MA. 188 pp.

Miller, K.G., R.E. Kopp, B.P. Horton, J.V. Browning, and A.C. Kemp. 2013. A geological perspective on sea-level rise and its impacts along the U.S. mid-Atlantic coast. Earth's Future (1): 3-18.

Najjar, R.G., H.A. Walker, P.J. Anderson, E.J. Barron, R.J. Bord, J.R. Gibson, V.S. Kennedy, C.G. Knight, J.P. Megonigal, R.E. O'Connor, C.D. Polsky, N.P. Psuty, B.A. Richards, L.G. Sorenson, E.M. Steele, and R.S. Swanson. 2000. The potential impacts of climate change on the mid-Atlantic coastal region. Climate Research 14: 219–233.

National Wildlife Federation and Manomet Center for Conservation Sciences. 2014. The vulnerabilities of northeastern fish and wildlife habitats to sea level rise. A report to the Northeastern Association of Fish and Wildlife Agencies and the North Atlantic Landscape Conservation Cooperative, Plymouth, MA. 55 pp.

NJ Division of Fish and Wildlife. 2012. New Jersey Landscape Project, Version 3.1. New Jersey Department of Environmental Protection, Division of Fish and Wildlife, Endangered and Nongame Species Program, Trenton, NJ. 33 pp.

Northeast Climate Impacts Assessment (NCIA). 2006. Climate Change in the U.S. Northeast: A report of the Northeast Climate Impacts Assessment. Union of Concerned Scientists, Cambridge, MA. 52 pp.

Office of the New Jersey State Climatologist (ONJSC). 2013. Climate Change in New Jersey: Trends in Temperature and Sea Level. NJ Department of Environmental Protection, Office of Science, Trenton, NJ. 6 pp.

Rice, T.M. 2015. Inventory of Habitat Modifications to Sandy Oceanfront Beaches in the U.S. Atlantic Coast Breeding Range of the Piping Plover (Chardrius melodus) prior to Hurricane Sandy: South Shore of Long Island to Virginia. Report submitted to the U.S. Fish and Wildlife Service, Hadley, Massachusetts. 47 pp.

Staudinger, M.D., S.L. Carter, M.S. Cross, N.S. Dubois, J.E. Duffy, C. Enquist, R. Griffis, J.J. Hellmann, J.J. Lawler, J. O'Leary, S.A. Morrison, L. Sneddon, B.A. Stein, L.M. Thompson, and W. Turner. 2013. Biodiversity in a changing climate: a synthesis of current and projected trends in the US. Frontiers in Ecology and the Environment 11(9): 465-473.

Staudinger, M. D., T. L. Morelli, and A. M. Bryan. 2015. Integrating Climate Change into Northeast and Midwest State Wildlife Action Plans. DOI Northeast Climate Science Center Report, Amherst, Massachusetts. 205 pp.

Stein, B.A., A. Staudt, and M.S. Cross., N.S. Dubois, C. Enquist, R. Griffis, L.J. Hansen, J.J. Hellmann, J.J. Lawler, E.J. Nelson, and A. Pairis. 2013. Preparing for and managing change: climate adaptation for biodiversity and ecosystems. Frontiers in Ecology and the Environment 11: 502-510.

The Nature Conservancy. 2009. Rising Waters: Helping Hudson River communities adapt to climate change scenario planning 2010 – 2030 Executive Summary. The Nature Conservancy, Albany, NY. 16 pp.

Trumbo, B.A., K.H. Nislow, J. Stallings, M. Hudy, E.P. Smith, D.Y. Kim, B. Wiggins, and C.A. Dolloff. 2014. Ranking site vulnerability to increasing temperatures in southern Appalachian brook trout streams in Virginia: an exposure-sensitivity approach. Transactions of the American Fisheries Society 143:173–187.

Werner, A.D. and CT. Simmons. 2009. Impact of Sea-Level Rise on Sea Water Intrusion in Coastal Aquifers. Ground Water 47(2): 197–204.

PHOTO ACKNOWLEDGEMENTS

Cover (Piping Plover): United States Fish & Wildlife Service

Executive Summary (Barred Owl): United States Fish & Wildlife Service

Attachment IV: Guidelines for Integrating Plant Species of Conservation Concern into Wildlife Action Planning and Implementation

Guidelines for Integrating Plant Species of Conservation Concern into Wildlife Action Planning and Implementation

Part 1: "Integrated Management Guidelines for Four Habitats and Associated State Endangered Plants and Wildlife Species of Greatest Conservation Need in the Skylands and Pinelands Landscape Conservation Zones of the New Jersey State Wildlife Action Plan," by E. Johnson and K. Walz.

This Plan explicitly focuses on the development and implementation of actions to conserve New Jersey's wildlife species of greatest conservation need (SGCN) and the habitats on which they depend. However, New Jersey also supports an extraordinarily diverse flora, described in Chapter 3, Section VI, including natural communities that provide significant habitat for wildlife SGCN and associated rare plants.

The actions, projects, and monitoring programs presented in this plan for wildlife also provide an opportunity to contribute to the conservation of rare plants and natural communities. At the same time, without proper precautions, actions directed at enhancing wildlife, especially on-the-ground actions that modify habitats, may pose risks to rare plants.

As such, it is important that land and wildlife managers consider plant communities when implementing conservation actions and monitoring programs. The resulting report, presented in Part 1 of this Appendix, focused on four habitat types within two landscape regions that are critical to a suite of plant and wildlife species. The report provides examples of how to integrate rare plant and wildlife conservation planning and adaptive management. Note the report follows the geographic organization of the 2008 Revised State Wildlife Action Plan.

Part 2: Distribution of Rare Plants and Natural Communities within New Jersey

The second part of this appendix provides location information on the distribution of rare plants and natural communities throughout New Jersey's six Landscape Regions described in Chapter 3. Understanding where such plant communities exist enables land and wildlife managers and researchers to consider plant communities in research and management planning and implementation.

Part 1: "Integrated Management Guidelines for Four Habitats and Associated State Endangered Plants and Wildlife Species of Greatest Conservation Need in the Skylands and Pinelands Landscape Conservation Zones of the New Jersey State Wildlife Action Plan," by E. Johnson and K. Walz.

Integrated Management Guidelines for Four Habitats and Associated State Endangered Plants and Wildlife Species of Greatest Conservation Need in the Skylands and Pinelands Landscape Conservation Zones of the New Jersey State Wildlife Action Plan

Prepared by

Elizabeth A. Johnson
Center for Biodiversity and Conservation
American Museum of Natural History
Central Park West at 79th Street
New York, NY 10024

and

Kathleen Strakosch Walz
New Jersey Natural Heritage Program
New Jersey Department of Environmental Protection
State Forestry Services
Office of Natural Lands Management
501 East State Street, 4th Floor
MC501-04, PO Box 420
Trenton, NJ 08625-0420

For

NatureServe
4600 N. Fairfax Drive – 7th Floor
Arlington, VA 22203
Project #DDF-0F-001a
Doris Duke Charitable Foundation (Plants)

June 2013

Acknowledgments:

Many thanks to the following for sharing their expertise to review and discuss portions of this report:

Allen Barlow, John Bunnell, Bob Cartica, Dave Jenkins, Sharon Petzinger, Dale Schweitzer, David Snyder, Mick Valent, Sharon Wander, Wade Wander, Andy Windisch, and Brian Zarate.

This report should be cited as follows:

Johnson, Elizabeth A. and Kathleen Strakosch Walz. 2013. **Integrated Management Guidelines for Four Habitats and Associated State Endangered Plants and Wildlife Species of Greatest Conservation Need in the Skylands and Pinelands Landscape Conservation Zones of the New Jersey State Wildlife Action Plan.** American Museum of Natural History, Center for Biodiversity and Conservation and New Jersey Department of Environmental Protection, Natural Heritage Program, for NatureServe, Arlington, VA. 149p.

TABLE OF CONTENTS

Page

Project Summary……..….. 4

Introduction……..…..5

Four Habitat Based Integrated Management Plans
- Calcareous Fens……..12
- Calcareous Sinkhole Ponds……..33
- Pine Barrens Savannas……..46
- Coastal Plain Intermittent Ponds……..61

Conclusions……..76

References Cited……79

APPENDICES

Page

Appendix A: Rarity Ranks for selected State Endangered Plant species and Wildlife Species of Greatest Conservation Need and Ranking Definitions
……..85

Appendix B: Habitat Classification
……..95

Appendix C: CMP Threats and Stresses Tables for State Endangered Plants and Wildlife SGCN
……101

Appendix D: Sample Sidebars and Information Boxes for SWAP 2015
……136

Appendix E: NJDEP Freshwater Wetlands Protection Act Rules definition of "Vernal Habitat" and lists of obligate and facultative faunal species found in vernal habitats
……139

Project Summary:

New Jersey is the first state projected to reach build-out, and pressure from competing land use interests and associated threats is high on the remaining open space. Therefore it is imperative to strategically protect and manage these natural areas for resiliency, as it is on these lands where the future of conservation lies for plants, animals and their critical habitats. Strengthening New Jersey's State Wildlife Action Plan (SWAP) will help address the growing need for guided protection and integrated management for species of greatest conservation need (SGCN).

While broad habitat categories based on vegetation communities are referenced in the New Jersey SWAP, plant species of conservation concern are not addressed (NJDEP 2008). The purpose of this project is to develop rare plant conservation strategies that complement conservation actions for animal species in the context of biodiversity protection and climate change in New Jersey. The project focused on two high-priority regions of the state with the development of a spatial framework and conservation strategy prototype that can be used in other regions of the state. Integrated rare plant and wildlife SGCN management guidelines will be incorporated into New Jersey's updated 2015 SWAP and implemented, as practicable, with state and NGO conservation partners.

The outcomes of this project include:

- ✧ Integrated management guidelines were developed for State Endangered plants and wildlife SGCN using a habitat approach. The four habitats include calcareous fens and sinkhole ponds in the Kittatinny Valley of northern New Jersey and coastal plain intermittent ponds and wet savannas in the Pine Barrens of southern New Jersey.
- ✧ Tables with Wildlife Conservation Management Plan (CMP) Threats and Wildlife Tracking and Reporting Actions for the Conservation of Species (TRACS) Conservation Actions were created for all 70 State Endangered plant species and 30 wildlife SGCN.
- ✧ Examples of supplemental sidebars were created for the SWAP featuring integrated management recommendations for relevant rare plant and wildlife SGCN/guilds by habitat within the SWAP Landscape Conservation Zones.
- ✧ The project opened a constructive dialogue between ENSP and NHP on integrated management issues with respect to rare plants, animals and their habitats.
- ✧ A significant outcome of the project was an awareness of the gap that exists in coordinating the management of natural resources in a state reaching build-out with limited areas left for habitat and species protection. We have realized that multiple projects occur on private or NGO lands that are not necessarily coordinated with other state efforts to integrate management of all elements of biodiversity (e.g., bog turtle habitat restoration projects). This understanding underscores the importance of reaching out to landowners involved in incentive programs in the future to educate them about rare plant conservation.

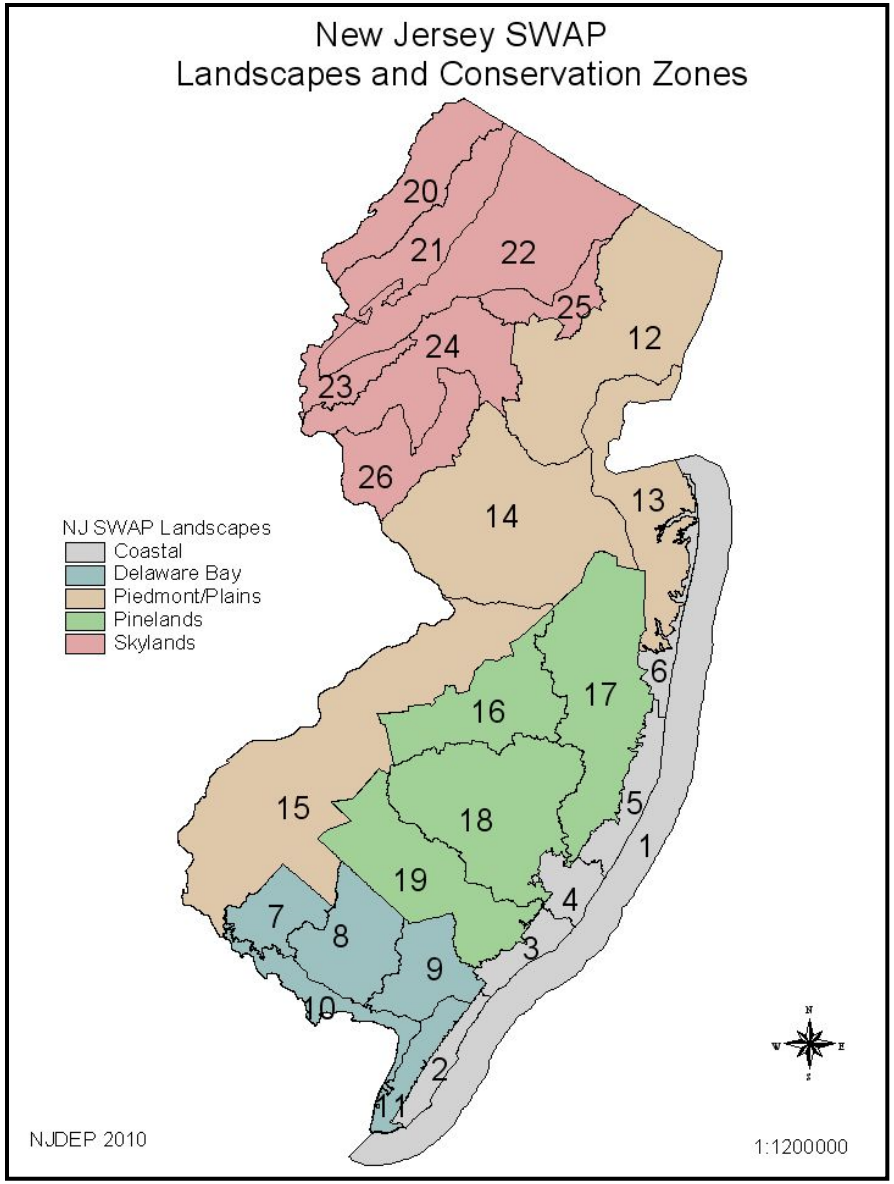
Introduction:

In 2005, as part of a national effort, New Jersey developed a State Wildlife Action Plan (SWAP) that seeks, in part, to identify the threats to wildlife and the conservation actions needed to address them. Since that time, the SWAP was updated in 2008 and has been used as a guiding document for agencies, organizations, and individuals working to conserve New Jersey's wildlife species of greatest conservation need (SGCN). Yet while the focus of the SWAP has been on animal species of conservation concern, many rare plants are also found in the same habitats as the animals. Unfortunately, plants were not included in the definition of "wildlife" provided in the federal guidelines for plan development and as a result, most plans do not address plants in any significant way (Stein and Gravuer 2008). This has led to some management conflicts over the years, where rare plant populations inadvertently were damaged due to incompatible management actions implemented for rare animal conservation.

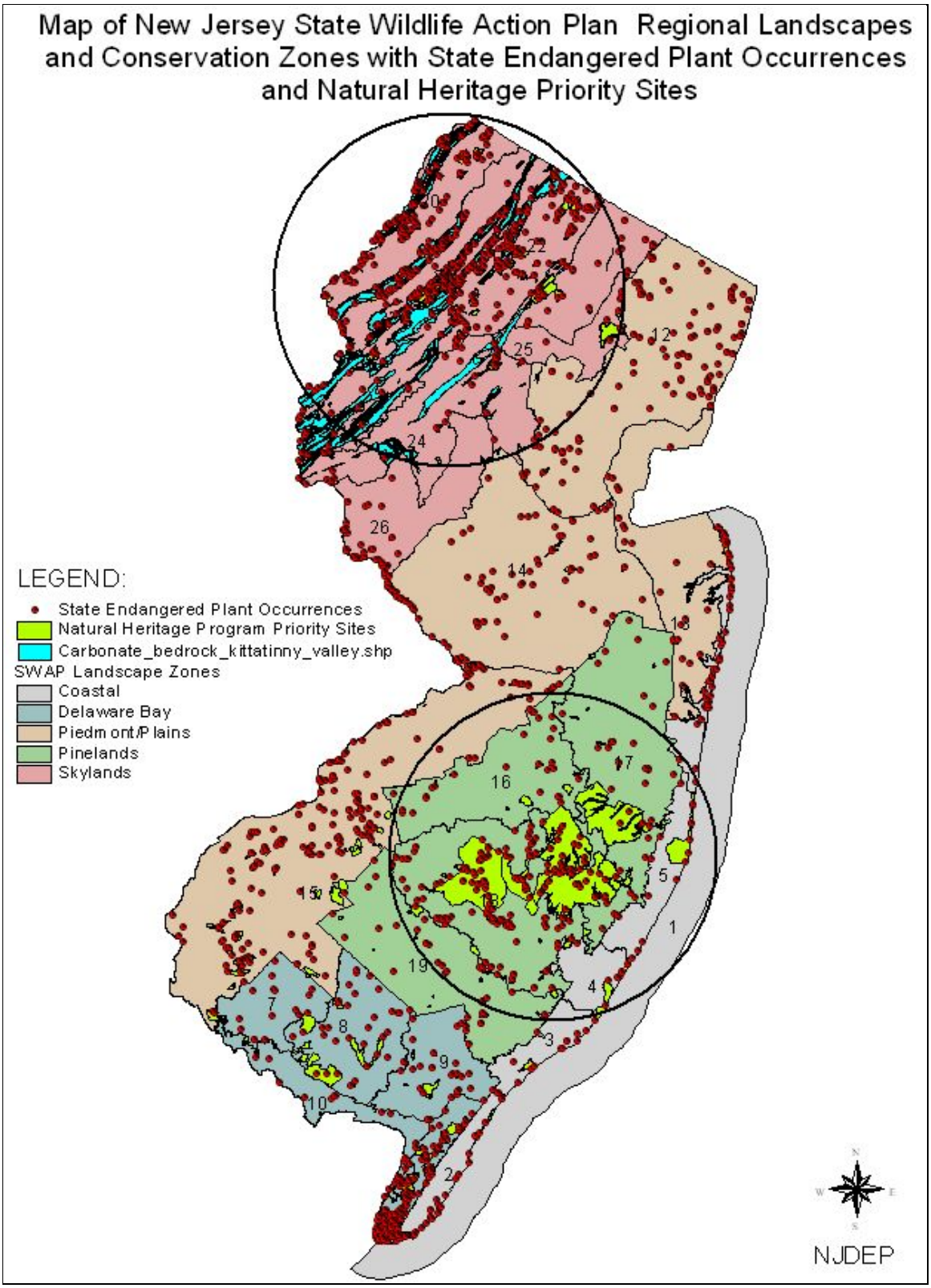
New Jersey is a small state, and predicted to be the first state to reach build-out. For these reasons, there is a very clear limit to the amount of habitat available to support biodiversity, New Jersey's plants and wildlife species, natural communities, and ecological processes. While New Jersey has protected close to 30 percent of its land area (Hasse and Lathrop 2010), many of these protected habitats are fragmented from each other and face significant external stresses. Another complication is the fact that most of New Jersey's endangered plant populations are found outside of state- or federally-protected lands (Breden et al. 2006) where protections for plants and/or their habitats are either non-existent or significantly weaker than for wildlife. Essentially, there are fewer safe habitats for plants than animals in New Jersey. While working with willing landowners to protect species and habitats on private lands are important conservation actions, it may be that the more lasting conservation actions are the ones taken on public lands. The challenge is how to meet the conservation needs of all species, plants and animals, in these remaining protected habitats.

To illustrate how this might be done in New Jersey, we selected four rare wetland habitats (Pine Barrens savannas, coastal plain intermittent ponds, calcareous fens, and calcareous sinkhole ponds). These wetlands support the highest diversity of both rare plants and wildlife SGCN in the state and the habitats themselves are also regionally and globally significant. For details on each of the four wetlands including habitat classification crosswalk, see individual habitat discussions.

For each of these four habitats we compiled a list of state endangered plant species from the 2012 Natural Heritage Program list of Plant Species of Conservation Concern, and a list of the animal species of greatest conservation need (game and nongame) identified from the 2008 New Jersey State Wildlife Action Plan and for which active management is anticipated in the near future. The following maps illustrate the habitat based conservation strategy approach and the tables list the species addresses in this report by habitat.



MAP LEGEND: NJ SWAP Landscape Regions and Conservation Zones		
MAP ID	LANDSCAPE REGION	CONSERVATION ZONE
1	Coastal	The Atlantic Ocean
2	Coastal	Atlantic Coastal Cape May
3	Coastal	Atlantic City Area
4	Coastal	Brigantine - Great Bay
5	Coastal	Barnegat Bay - Little Egg Harbor
6	Coastal	Northern Atlantic Coastal
7	Delaware Bay	Cohansey
8	Delaware Bay	Maurice
9	Delaware Bay	Tuckahoe
10	Delaware Bay	Shoreline
11	Delaware Bay	Peninsula
12	Piedmont/Plains	Northern Piedmont Plains
13	Piedmont/Plains	Raritan Bay
14	Piedmont/Plains	Central Piedmont Plains
15	Piedmont/Plains	Southern Piedmont Plains
16	**Pinelands**	**Western Pinelands**
17	**Pinelands**	**Northern Pinelands**
18	**Pinelands**	**Mullica River Watershed**
19	**Pinelands**	**Southern Pinelands**
20	**Skylands**	**Upper Delaware River Valley & Kittatinny Ridge**
21	**Skylands**	**Kittatinny Valley**
22	**Skylands**	**Northern Highlands**
23	Skylands	Upper Delaware/Musconetcong River Valleys
24	Skylands	Central Highlands
25	Skylands	Urban Highlands
26	Skylands	Southern Highlands


Map of New Jersey State Wildlife Action Plan Regional Landscapes and Conservation Zones with State Endangered Plant Occurrences and Natural Heritage Priority Sites
LEGEND:
State Endangered Plant Occurrences
Natural Heritage Program Priority Sites
Carbonate_bedrock_kittatinny_valley.shp
SWAP Landscape Zones
Coastal
Delaware Bay
Piedmont/Plains
Pinelands
Skylands
NJDEP

State Endangered Plan Species and Animal Species of Greatest Conservation Need by NJ SWAP Landscape Region and Habitat

NJ SWAP LANDSCAPE REGION	HABITAT TYPE	NUMBER OF ENDANGERED PLANT SPECIES	NUMBER OF ANIMAL SPECIES OF GREATEST CONSERVATION NEED
Pinelands	Pine Barren Savannas	14	6
Pinelands	Coastal Plain Intermittent Pond	17	5
Skylands	Calcareous Fen	28	17
Skylands	Calcareous Sinkhole Pond	13	3
2 REGIONS	4 HABITATS	70 PLANTS*	30 ANIMALS*

* Note that 2 plant species and 1 animal species occur in 2 different habitats but are counted only once in the total number of species by habitat

STATE ENDANGERED PLANT SPECIES LIST BY SWAP LANDSCAPE REGION AND HABITAT		
REGION: SKYLANDS	**Common name**	**Scientific name**
Habitat type: Calcareous Fen (28 species)		
	Bog Rosemary	*Andromeda glaucophylla*
	Rush Aster	*Aster borealis*
	Foxtail Sedge	*Carex alopecoidea*
	Water Sedge	*Carex aquatilis*
	Lesser Panicled Sedge	*Carex diandra*
	Handsome Sedge	*Carex formosa*
	Cyperus-like Sedge	*Carex pseudocyperus*
	Tuckerman's Sedge	*Carex tuckermanii*
	Wood's Sedge	*Carex woodii*
	Marsh Cinquefoil	*Comarum palustris*
	Hemlock-parsley	*Conioselinum chinense*
	Small White Lady's-slipper	*Cypripedium candidum*
	Showy Lady's-slipper	*Cypripedium reginae*
	Few-flower Spike-rush	*Eleocharis quinqueflora*
	Variegated Horsetail	*Equisetum variegatum var. variegatum*
	Queen-of-the-prairie	*Filipendula rubra*
	Labrador Marsh Bedstraw	*Galium labradoricum*
	Small Bedstraw	*Galium trifidum var. trifidum*
	Northern Panic Grass	*Panicum boreale*
	Capillary Beaked-rush	*Rhynchospora capillacea*
	Orange Coneflower	*Rudbeckia fulgida var. fulgida*
	Shining Willow	*Salix lucida ssp. lucida*
	Bog Willow	*Salix pedicellaris*
	Strict Blue-eyed Grass	*Sisyrinchium montanum var. crebrum*
	Arborvitae	*Thuja occidentalis*
	Seaside Arrow-grass	*Triglochin maritima*
	Spreading Globe Flower	*Trollius laxus ssp. laxus*
	Sessile Water-speedwell	*Veronica catenata*
Habitat type: Calcareous Sinkhole Pond (13 species)		
	Large Water-plantain	*Alisma triviale*
	Appalachian Mountain Boltonia	*Boltonia montana*
	Cloud Sedge	*Carex haydenii*
	Hop-like Sedge	*Carex lupuliformis*
	Small Floating Manna Grass	*Glyceria borealis*

	Larger Canadian St. John's Wort	*Hypericum majus*
	Water-marigold	*Megalodonta beckii*
	Lake Water-cress	*Neobeckia aquatica*
	Wiry Panic Grass	*Panicum flexile*
	Arum-leaf Arrowhead	*Sagittaria cuneata*
	Torrey's Bulrush *	*Schoenoplectus torreyi*
	Small Burr-reed	*Sparganium natans*
	Lesser Bladderwort	*Utricularia minor*
REGION: PINELANDS	**Common name**	***Scientific name***
Habitat type: Pine Barren Savanna (14 species)		
	Pickering's Reed Grass	*Calamagrostis pickeringii*
	Spreading Pogonia	*Cleistes divaricata*
	Rough Cotton-grass	*Eriophorum tenellum*
	Pine Barren Boneset	*Eupatorium resinosum*
	New Jersey Rush	*Juncus caesariensis*
	Bog Asphodel	*Narthecium americanum*
	Yellow Fringeless Orchid	*Platanthera integra*
	Knieskern's Beaked-rush	*Rhynchospora knieskernii*
	Long's Woolgrass	*Scirpus longii*
	Lace-lip Ladies'-tresses	*Spiranthes laciniata*
	False Asphodel	*Tofieldia racemosa*
	Reversed Bladderwort *	*Utricularia resupinata*
	Fringed Yellow-eyed-grass	*Xyris fimbriata*
	Death-camus	*Zigadenus leimanthoides*
Habitat type: Coastal Plain Intermittent Pond (17 species)		
	Southern Boltonia	*Boltonia asteroides var. glastifolia*
	Wrinkled Jointgrass	*Coelorachis rugosa*
	Marsh Flat Sedge	*Cyperus pseudovegetus*
	Hirst Brothers' Panic Grass	*Dichanthelium hirstii (Panicum hirstii)*
	Larger Buttonweed	*Diodia virginiana var. virginiana*
	Knotted Spike-rush	*Eleocharis equisetoides*
	Featherfoil	*Hottonia inflata*
	Barton's St. John's-wort	*Hypericum adpressum*
	Clasping-leaf St. John's-wort	*Hypericum gymnanthum*
	Boykin's Lobelia	*Lobelia boykinii*
	Narrow-leaf Primrose-willow	*Ludwigia linearis*
	Awned Meadow-beauty	*Rhexia aristosa*
	Small-head Beaked-rush	*Rhynchospora microcephala*
	Slender Arrowhead	*Sagittaria teres*
	Torrey's Bulrush *	*Schoenoplectus torreyi*
	Dwarf White Bladderwort	*Utricularia olivacea*
	Reversed Bladderwort *	*Utricularia resupinata*

WILDLIFE SGCN SPECIES LIST BY SWAP LANDSCAPE REGION AND HABITAT		
REGION: SKYLANDS	**Common name**	**Scientific name**
Habitat type: Calcareous Fen (17 species)		
Bird	Veery	*Catharus fuscescens*
Bird	Sedge wren	*Cistothorus platensis*
Bird	Black-billed cuckoo	*Coccyzus erythropthalmus*
Bird	Least flycatcher	*Empidonax minimus*
Bird	Red-headed woodpecker	*Melanerpes erythrocephalus*
Bird	Northern parula *	*Setophaga (Parula) americana*
Bird	American woodcock	*Scolopax minor*
Bird	Winter wren	*Troglodytes hiemalis*
Bird	Golden-winged warbler	*Vermivora chrysoptera*
Bird	Canada warbler	*Cardellina (Wilsonia) canadensis*
Butterfly	Silver-bordered Fritillary	*Boloria selene myrina*
Butterfly	Mitchell's Satyr	*Neonympha mitchellii mitchellii*
Moth	Schweitzer's buckmoth	*Hemileuca nevadensis ssp. 2*
Dragonfly	Kennedy's Emerald	*Somatochlora kennedyi*
Dragonfly	Brush-tipped Emerald	*Somatochlora walshii*
Reptile	Spotted turtle	*Clemmys guttata*
Reptile	Bog turtle	*Glyptemys (Clemmys) muhlenbergii*
Habitat type: Calcareous Sinkhole Pond (3 species)		
Amphibian	Jefferson salamander	*Ambystoma jeffersonianum*
Amphibian	Marbled salamander	*Ambystoma opacum*
Amphibian	Long-tailed salamander	*Eurycea longicauda longicauda*
REGION: PINELANDS	**Common name**	***Scientific name***
Habitat type: Pine Barren Savanna (6 species)		
Bird	Northern parula*	*Setophaga (Parula) americana*
Butterfly	Arogos skipper	*Atrytone arogos arogos*
Butterfly	Helicta Satyr (Georgia Satyr)	*Neonympha helicta (Neonympha areolata septentrionalis)*
Mammal	Southern bog lemming	*Synaptomys cooperi*
Moth	Moth	*Dichagyris reliqua*
Moth	Carter's noctuid moth	*Photedes (Spartiniphaga) carterae*
Habitat type: Coastal Plain Intermittent Pond (5 species)		
Amphibian	Pine Barrens treefrog	*Hyla andersonii*
Amphibian	Carpenter frog	*Lithobates virgatipes*
Dragonfly	Scarlet Bluet	*Enallagma pictum*
Dragonfly	Pine Barrens Bluet	*Enallagma recurvatum*
Dragonfly	Golden-winged skimmer	*Libellula auripennis*

* Note that 2 plant species (*Schoenoplectus torreyi* and *Utricularia resupinata*) and 1 animal species (*Setophaga americana*) occur in 2 different habitats but are counted only once in the total number of species addressed in this report.

We identified key threats to plants and animals in each habitat using the Conservation Measures Partnership (CMP) THREATS classification (see Salafsky et al. 2008 for the lexicon). The Threats categories are listed below. See Appendix C for the table of CMP Threats for each of the state endangered plant species and wildlife SGCN by habitat addressed in this study.

CMP THREATS Categories:

1. Residential and Commercial Development
2. Agriculture & Aquaculture
3. Energy Production & Mining
4. Transportation & Service Corridors
5. Biological Resource Use
6. Human Intrusions and Disturbance
7. Natural Systems Modifications
8. Invasive and Other Problematic Species & Genes
9. Pollution
10. Geological Events
11. Climate Change & Severe Weather

In future years, the USFWS will be adopting the Wildlife Tracking and Reporting Actions for the Conservation of Species (TRACS) as the reporting framework for tracking conservation actions funded by State Wildlife grants that implement actions identified in SWAPs (USFWS 2013). New Jersey will be adopting the TRACS language in their 2015 SWAP update so we have included a correlation with this report. The 13 TRACS Actions at Level 1 are listed below, are addressed in the integrated management guidelines for the four habitats in this report.

Wildlife TRACS ACTIONS

1. Coordination and Administration
2. Create, Restore, or Enhance Habitat and Natural Processes
3. Data Collection and Analysis
4. Education
5. Facilities and Areas/New Construction
6. Facilities and Areas/Major Renovation
7. Facilities and Areas/Operations and Maintenance
8. Land and Water Rights/Acquisition and Protection
9. Law Enforcement
10. Outreach
11. Planning
12. Species Reintroduction and Stocking
13. Technical Assistance

We then looked at proposed management actions identified in the 2008 SWAP that addressed threats to the habitat and/or SGCN species, to identify possible impacts to the rare plants in the same habitat. We offer suggestions for ways to avoid or mitigate management conflicts for the given suites of species. And finally, we looked at the potential effects of climate change on species and habitats with an emphasis on identifying future management conflicts that might arise from new actions proposed to adapt to projected climate changes. Following are discussion points for each of the four habitats and their rare plant and wildlife SGCN, presented as integrated management guideline, followed by a summary for all.

Integrated Management Guidelines: CALCAREOUS FEN HABITAT

Spreading globe flower *(Trollius laxus spp. laxus);* Calcareous Fen; Bog turtle *(Glyptemys muhlenbergii)*

Overview

Calcareous fens are distinctive wetlands that depend on a constant supply of cold, oxygen-poor ground water rich in calcium and magnesium bicarbonates. This calcium-rich environment supports a plant community dominated by "calciphiles," or calcium-loving species. These fens typically occur on slight slopes where upwelling ground water surfaces slowly and surface water inputs are minimal. The substrate is peat, muck or marl, and usually saturated to the surface, with seeps and shallow pools of water surrounded by low, tussocky, grass- and sedge-dominated vegetation. The substrate is springy or quaking underfoot (Walz 2006).

In New Jersey, calcareous fens are located predominantly in the Kittatinny Valley of northwestern New Jersey (Sussex and Warren counties) and support numerous rare plant and animal species with diverse management needs. There are eight different calcareous fen ecological community types found in New Jersey, but for the purposes of this report we are addressing fens as a habitat system, not focusing just on one particular fen type.

Calcareous fens are included in the NE Wildlife Habitat Classification System as North-Central Appalachian Seepage; in the New Jersey Landscape Map as Emergent, Forest and Wetland Species-Based Habitat; and mapped in the New Jersey Land Use/Land Cover as Emergent Wetlands, Deciduous Scrub/Shrub Wetlands, Coniferous Scrub/Shrub Wetlands, Mixed Scrub-Shrub Wetlands (Deciduous Dominant), Mixed Scrub-Shrub Wetlands (Coniferous Dominant). See Appendix B for more details on habitat classification.

Twenty-eight (28) state endangered plant species occur in calcareous fens, including Bog Rosemary (*Andromeda glaucophylla*), Rush Aster (*Aster borealis*), Foxtail Sedge (*Carex alopecoidea*), Water Sedge (*Carex aquatilis*), Lesser Panicled Sedge (*Carex diandra*), Handsome Sedge (*Carex formosa*), Cyperus-like Sedge (*Carex pseudocyperus*), Tuckerman's Sedge (*Carex tuckermanii*), Wood's Sedge (*Carex woodii*), Marsh Cinquefoil (*Comarum palustris*), Hemlock-parsley (*Conioselinum chinense*), Small White Lady's-slipper (*Cypripedium candidum*), Showy Lady's-slipper (*Cypripedium reginae*), Few-flower Spike-rush (*Eleocharis quinqueflora*), Variegated Horsetail (*Equisetum variegatum var. variegatum),* Queen-of-the-prairie (*Filipendula rubra),* Labrador Marsh Bedstraw (*Galium*

labradoricum), Small Bedstraw (*Galium trifidum var. trifidum),* Northern Panic Grass (*Panicum boreale),* Capillary Beaked-rush (*Rhynchospora capillacea),* Orange Coneflower(*Rudbeckia fulgida var. fulgida),* Shining Willow (*Salix lucida ssp. Lucida),* Bog Willow (*Salix pedicellaris),* Strict Blue-eyed Grass (*Sisyrinchium montanum var. cerebrum),* Arborvitae (*Thuja occidentalis),* Seaside Arrow-grass (*Triglochin maritime),* Spreading Globe Flower (*Trollius laxus ssp. Laxus),* Sessile Water-speedwell (*Veronica catenata).* See Appendix A for complete list of state endangered plant species with rarity rankings. Seventeen wildlife species identified as Species of Greatest Conservation Need (SGCN) in the 2008 version of the New Jersey State Wildlife Action Plan (SWAP) also occur in fens including: two reptiles (bog turtle [*Glyptemys (Clemmys) muhlenbergii*] and spotted turtle [*Clemmys guttata*]; several Lepidoptera (Mitchell's satyr [*Neonympha mitchellii mitchellii*], Schweitzer's buckmoth [*Hemileuca nevadensis species 2]*, silver-bordered fritillary [*Boloria selene*]); two dragonflies (Kennedy's emerald [*Somatochlora kennedyi*] and brush-tipped emerald [*Somatochlora walshii*]); ten nesting bird species (red-headed woodpecker [*Melanerpes erythrocephalus*], golden-winged warbler [*Vermivora chrysoptera*], Canada warbler [*Cardellina (Wilsonia) canadensis*], sedge wren [*Cistothorus platensis*], winter wren [*Troglodytes hiemalis*], northern parula [*Setophaga* (*Parula) americana*], black–billed cuckoo [*Coccyzus erythropthalmus*], least flycatcher [*Empidonax minimus*], veery [*Catharus fuscescens*] and a game species of regional priority, the American woodcock [*Scolopax minor*]). See Appendix A for list of wildlife SGCN with rarity rankings.

Threats

Altered hydrology and degraded water quality associated with development (whether residential or industrial) or adjacent agricultural practices are the main threats to calcareous fens. For example, groundwater withdrawals that lower the water table or drainage ditches that divert water out of the wetlands change the habitat significantly and affect associated rare species.

Water laden with fertilizers from adjacent farmland or homeowners' lawns as well road runoff can negatively impact plants in wetlands downslope due to changes in water chemistry. Calcareous fens are characterized by high pH with high levels of calcium and magnesium in the water and the plant community in particular is adapted to this water chemistry.

Flooding from beaver activity, while a natural process, can threaten fen habitats that support rare plants, rare Lepidoptera and bog turtles. Vegetation succession (e.g., from open herbaceous vegetation to shrub swamp) can also be a threat, despite the fact that vegetation change through time is a natural process. Typically, as some fen wetlands become shrubbier, others open up on the landscape due to beaver activity or other disturbance processes. Wetland connectivity among sites enables plants and animals to disperse to more suitable habitats as these changes occur. However, today few calcareous wetland habitats remain intact and most are separated from each other by roads, development or other unsuitable habitat, so plants and animals are unable to find new suitable habitat when the vegetation structure and hydrology in a fen changes.

Invasive species, such as purple loosestrife (*Lythrum salicaria*) and common reed (*Phragmites australis*) also threaten the integrity of fen habitats, crowding out native vegetation and altering site characteristics required by plants like spreading globe flower and animals like the bog turtle (Snyder and Kaufman 2004). The use of pesticides for insect pest control (e.g., gypsy moth or mosquito control) can threaten butterfly and moth populations (Schweitzer et al. 2011). Overabundant animals like white-tailed deer may over-browse sensitive fen vegetation (NJDEP 2008). Off Road Vehicle (ORV) use and other intensive recreational activities compact soil, destroy vegetation, and can harm wetland-dependent species such as dragonflies and bog turtles (Switalski and Jones 2012). Individual taxa (e.g., orchids, some Lepidoptera, and both turtle species) are also threatened by illegal collecting (NJDEP 2008).

A summary of CMP Threats to state endangered plants and wildlife SGCN in calcareous fen habitat is found in Appendix C.

Species Ecology

Calcareous fens are wetlands characterized by sedges, grasses and brown mosses (non-*Sphagnum*), a relatively high water table, nutrient-poor, mineral-rich (calcium and/or magnesium) alkaline waters, with shallow rivulets and groundwater seepage areas among hummocky herbaceous vegetation. Each plant and animal species that occurs in calcareous fens has specific habitat and/or management needs, as each requires slightly different microclimate and vegetation zones within the fen. In fact, most calcareous fen plants have evolved with adaptations to tolerate high calcium and magnesium concentrations, which cause neutral to alkaline pH, as well as hydrology adaptations to such conditions as perpetual exposure to groundwater seepage (Bedford and Godwin 2003).

Plants:

Calcareous fens are extraordinarily diverse wetlands that support approximately 275 plant species, of which 55 are rare including 28 listed as state endangered that are addressed in this report. Many of them are northern species that reach their southern limit in or near New Jersey. Examples include arborvitae, bog rosemary, bog willow and many of the carices. A few have a wider distribution but are considered rare due mainly to the restricted distribution of calcareous fen habitat in the state. These include marsh cinquefoil (*Potentilla palustris),* variegated horsetail (*Equisetum variegatum*), orange coneflower (*Rudbeckia fulgida*), queen-of-the-prairie (*Filipendula rubra*), and Labrador marsh bedstraw *(Galium labradoricum)*.

The following two tables provide a list of state endangered species that can found in calcareous fens in New Jersey with their phenology, or timing of vegetative, flowering and fruiting, and comments on their habitat/niche. The phenology and habitat information can be used to help avoid negative impacts to these state endangered plant species during wildlife surveys and management activities.

FL = Flowering; FR = Fruiting; V = Vegetative

Phenology of State Endangered Plant Species in Calcareous Fen Habitat		**APRIL**		**MAY**		**JUNE**		**JULY**		**AUG**		**SEPT**		**OCT**		**NOV**	
Scientific Name	**Common Name**	**1-15**	**16-30**	**1-15**	**16-31**	**1-15**	**16-30**	**1-15**	**16-31**	**1-15**	**16-31**	**1-15**	**16-30**	**1-15**	**16-31**	**1-15**	**16-30**
Andromeda glaucophylla	Bog Rosemary	V	FL	FL	FL	FL, FR	FR	FR	FR	V	V	V	V	V	V	V	V
Aster borealis	Rush Aster								FL	FL	FL	FL, FR	FL, FR	FL, FR	FR	FR	
Carex alopecoidea	Foxtail Sedge				FL, FR	FL, FR	FR	FR									
Carex aquatilis	Water Sedge				FL, FR	FL, FR	FL, FR	FR	FR	FR	FR						
Carex diandra	Lesser Panicled Sedge				FL, FR	FL, FR											
Carex formosa	Handsome Sedge					FR	FR										
Carex pseudocyperus	Cyperus-like Sedge				FL	FL, FR	FR	FR	FR	FR	FR						
Carex tuckermanii	Tuckerman's Sedge					FL, FR	FL, FR	FR									
Carex woodii	Wood's Sedge		FL	FL	FL, FR	FR	FR										
Comarum palustre	Marsh Cinquefoil					FL	FL	FL, FR	FR	FR							
Conioselinum chinense	Hemlock-parsley										FL	FL, FR	FL, FR	FR			
Cypripedium candidum	Small White Lady's-slipper				FL	FL											
Cypripedium reginae	Showy Lady's-slipper					FL	FL	FR	FR	FR	FR	FR	FR				
Eleocharis quinqueflora	Few-flower Spike-rush						FL, FR	FR	FR	FR	FR	FR	FR	FR			
Equisetum variegatum var. variegatum	Variegated Horsetail	V	V	V	V	V	V	V	V	FR	FR	FR	FR	FR	FR	V	V

Phenology of State Endangered Plant Species in Calcareous Fen Habitat (continued)		**APRIL**		**MAY**		**JUNE**		**JULY**		**AUG**		**SEPT**		**OCT**		**NOV**	
Scientific Name	**Common Name**	**1-15**	**16-30**	**1-15**	**16-31**	**1-15**	**16-30**	**1-15**	**16-31**	**1-15**	**16-31**	**1-15**	**16-30**	**1-15**	**16-31**	**1-15**	**16-30**
Filipendula rubra	Queen-of-the-prairie					*FL*	FL	FL	*FL*	FL, FR	FL, FR	FR	FR				
Galium labradoricum	Labrador Marsh Bedstraw						FL	FL	FL, FR	FR	FR	FR					
Galium trifidum var. trifidum	Small Bedstraw							FL	FL	FL, FR	FR	FR	FR				
Panicum boreale	Northern Panic Grass				FL	FL, FR	FL, FR	FL, FR	FR								
Rhynchospora capillacea	Capillary Beaked-rush								FL	FL, FR	FL, FR	FL, FR	FR	FR			
Rudbeckia fulgida var. fulgida	Orange Coneflower											FL	FL	FL, FR	FR		
Salix lucida ssp. Lucida	Shining Willow				FL, FR	FR	FR										
Salix pedicellaris	Bog Willow		FL	FL	FL	FL, FR	FR	FR	FR	FR							
Sisyrinchium montanum var. cerebrum	Strict Blue-eyed Grass				FL	FL	FL, FR	FR	FR								
Thuja occidentalis	Arborvitae	V	V	V	V	V	V	V	V	V	V	V	FR	FR	FR	FR	FR
Triglochin maritima	Seaside Arrow-grass				FL	FL, FR	FL, FR	FL, FR	FR	FR	FR	FR	FR	FR			
Trollius laxus ssp. Laxus	Spreading Globe Flower		FL	FL	FL	FL	FR	FR	FR	FR	FR	FR	FR				
Veronica catenata	Sessile Water-speedwell						FL	FL, FR	FL, FR	FL, FR	FR						

SOURCE: New Jersey Natural Heritage Program, Biotics Database

SOURCE: New Jersey Natural Heritage Program, Biotics Database

Calcareous Fen Habitat -- State Endangered Plant Habitat/Niche Comments

Scientific Name	**Common Name**	**Calcareous Fen Habitat/Niche Comments**
Andromeda glaucophylla	Bog Rosemary	Restricted to thickets and openings in sphagnous bogs, and more rarely in calcareous fens that have well developed sphagnous hummocks
Aster borealis	Rush Aster	Grows in open, peaty limestone fens, marl fens, and other limestone wetlands
Carex alopecoidea	Foxtail Sedge	Grows in swampy calcareous meadow, low woods at edge of pond, swampy meadows, in NJ this species apparently is restricted to calcareous wetlands
Carex aquatilis	Water Sedge	Grows in open calcareous seepage fens
Carex diandra	Lesser Panicled Sedge	Swampy, marshy, or boggy areas, especially wet meadows, fens, floating mats, and peaty or marly shores of lakes and ponds
Carex formosa	Handsome Sedge	Typically occurs in or at the edge of limey swamps, seeps, or bottomland forests
Carex pseudocyperus	Cyperus-like Sedge	Grows in open calcareous marsh and open areas of a calcareous swamp
Carex tuckermanii	Tuckerman's Sedge	Found in rich or calcareous open wetlands
Carex woodii	Wood's Sedge	Grows in black, mucky peaty soil on sedge hummocks in shrubby calcareous fen habitat
Comarum palustre	Marsh Cinquefoil	Grows in floating turf of sedge and sphaghum moss in shallow water, sphagnous or peaty seepage areas in calcareous marshes and wooded swamps
Conioselinum chinense	Hemlock-parsley	Grows in wooded seepage areas along small streams or brooks in calcareous or basic soils
Cypripedium candidum	Small White Lady's-slipper	Grows in light to fairly heavy shade of overgrown portion of calcareous fen, reportedly associated with larch
Cypripedium reginae	Showy Lady's-slipper	Grows in shrub borders or open thickets in calcareous fens and wooded swamps; prefers constant moisture and full sun to semi-shaded conditions

Scientific Name	**Common Name**	**Calcareous Fen Habitat/Niche Comments**
Eleocharis quinqueflora	Few-flower Spike-rush	Restricted to wet, marl of ponds margins and fens
Equisetum variegatum var. variegatum	Variegated Horsetail	Occurs in seepage areas on marl deposits at edge of water
Filipendula rubra	Queen-of-the-prairie	Grows in brushy calcareous fens along edge of wooded swamps
Galium labradoricum	Labrador Marsh Bedstraw	Grows in wet sphagnum or peat of calcareous pond shores, sedge mats, and fens.
Galium trifidum var. trifidum	Small Bedstraw	Grows in sphagnum or mosses of calcareous fens and along edge of marl pond shores
Panicum boreale	Northern Panic Grass	Grows in open, wet swales of calcareous fens
Rhynchospora capillacea	Capillary Beaked-rush	Restricted to seepage areas in marl and calcareous fens.
Rudbeckia fulgida var. fulgida	Orange Coneflower	Grows in calcareous fens
Salix lucida ssp. lucida	Shining Willow	Grows in sedge meadows; vernal pools, alvars, open calcareous fens, marl bogs
Salix pedicellaris	Bog Willow	Grows in open to shrubby calcareous fens and swamps; occassionally in more sphagnous habitats with a calcareous substrate
Sisyrinchium montanum var. cerebrum	Strict Blue-eyed Grass	Grows in among calcareous rocks in seepage areas on river shores and in moist grassy places and calcareous fens
Thuja occidentalis	Arborvitae	Grows in peaty and sphagnous calcareous seepage fens
Triglochin maritima	Seaside Arrow-grass	Grows in open, calcareous seepage fens
Trollius laxus ssp. laxus	Spreading Globe Flower	Grows in wetlands influenced by cold, highly alkaline groundwater seepage; open fens, along swamp margins, and in partly sunny, wet openings in seepage swamps; sloping fens on sedge tussocks somewhat above the saturated soils, or on seepy mineral soil.
Veronica catenata	Sessile Water-speedwell	Grows in shallow water of small brooks in calcareous seepage fens

SOURCE: New Jersey Natural Heritage Program, Biotics Database

The rarest are Wood's sedge (*Carex woodii*) and handsome sedge (*Carex formosa*), which are found in only one location statewide, spreading globe flower (*Trollius laxus* ssp*. laxus*) which is globally rare, and arborvitae (*Thuja occidentalis*) which is at the southern limit of its range. *Trollius* has a very limited distribution, being found in only four states (NY, NJ, CT,

and PA), with New Jersey supporting the largest population worldwide. Calcareous fens in New Jersey also are characterized by the presence of eastern red cedar (*Juniperus virginiana*), which is found more typically in upland habitats. Both woody plants, *Thuja* and *Juniperus*, are particularly vulnerable to deer browsing as they provide succulent winter forage. Other rare plants especially targeted by deer include orchids.

All species rely on fen hydrology characterized by rich, perennial, and groundwater seepage. The groundwater dominant hydrology helps form a hummock and hollow microtopography where plant distribution is based on elevation above water level – those that need less water live on the hummocks and those tolerant of more water live in the hollows. Some plants such as few-flowered spikerush (*Eleocharis pauciflora*) need patches of bare soil without competition from other rhizomatous species to survive.

Calcareous fens are patchy habitats, often characterized by a mosaic of open sunny areas with herbaceous plants and dense shrubby areas. Plants and animals each find their own niche in this mosaic, with animals often moving between these areas at different times of the day or year.

There are a number of rare orchids that live in calcareous fen habitat and nowhere else. Orchids in particular have a complex life history. They do not bloom in every year and seed germination is highly dependent on a number of environmental factors, hence they are very sensitive to disturbance. They are also particularly sensitive to browsing by deer. In fact, the exact management needs for many of the calcareous fen-dependent species are not known. Therefore, maintaining the site hydrology and water chemistry, in part by maintaining sufficient buffers around wetlands to prevent runoff with road salt, fertilizers or other pollutants from entering the fen, minimizing deer herbivory, and preventing trampling of the vegetation and soil are all critical.

Animals:

Bog turtles live in spring fed sphagnum bogs, fens, and wet meadows with clear slow moving rivulets and a soft organic substrate that support low grasses and sedges. Active April through September, they will estivate in moist mud in rivulets or hide under sedge tussocks during extended periods of heat in summer. Bog turtles prefer nesting in raised hummocks, such as moss beds, in sunny open areas of the wetland. They hibernate from late September to March/April in soft-bottomed waterways, tree stumps, or beneath sedge tussocks (Ernst et al. 1994, Liguori and Tesauro 2003, B. Zarate, personal communication, 2013).

Spotted turtles use a variety of shallow water habitats such as bogs, wet pastures and marshes, with fens also providing important habitat. In New Jersey they are active from March through September. They nest in late May/June in grass tussocks, or hummocks of moist sphagnum moss and spend the winter in soft muddy stream bottoms (Ernst et al. 1994).

Habitat fragmentation that eliminates connectivity between wetlands, shrub encroachment that eliminates open herbaceous openings, as well as illegal collecting for the pet trade are the major threats to both turtle species.

The **Kennedy's emerald** dragonfly is a northern species that reaches its southern limit in New Jersey. It inhabits cold-water calcareous fens, often with small streams flowing through them. Adult emerald dragonflies emerge in May and are active through June, with females laying eggs in open water portions of the fen. Larvae may spend a number of years as aquatic naiads (larval stage) before emerging as adults (Nikula et al. 2003, Barlow et al. 2009).

The **brush-tipped emerald** dragonfly is active from early June through early August and is found in fens and open swamps with clear slow moving rivulets. A northern species, this emerald also reaches its southern limit in New Jersey. Females lay their eggs in open water near emergent vegetation and have an aquatic larval stage that may last more than one year. Adults forage along forest edges around the fen (Nikula et al. 2003, Barlow et al. 2009).

The main threats to these dragonflies are altered hydrology and degradation of water quality.

Mitchell's satyr butterfly was presumed extirpated from New Jersey in the mid-1980s. Satyr numbers had declined significantly prior to that time due to the loss of its wetland habitat, however over-collecting of the last remaining population may have been a contributing factor in its extirpation from the state. It is rare throughout its range, which includes isolated populations in Alabama, Indiana, Michigan, Mississippi, North Carolina, and Virginia (Hamm et al. 2013, NatureServe 2013a). Mitchell's satyr relies on open, wet meadows, as their larvae feed on sedges. They overwinter as fourth instar larvae. These butterflies may have a limited ability to colonize new fens by following narrow watercourses (Gochfeld and Burger 1997).

Schweitzer's buckmoth is only found in the limestone region of Sussex and Warren County, New Jersey. Adults fly during the day in late September and early October. Eggs are laid in a ring around the lower stem of the food plant and remain until spring, when the larvae emerge. Caterpillars feed on willow (*Salix* spp.), bog birch (*Betula pumila*), and shrubby cinquefoil (*Dasiflora fruticosa* ssp. *floribunda*), pupate in July in *Sphagnum* moss, and emerge as adults in the fall (NatureServe 2013b).

The **silver-bordered fritillary** ranges across southern Canada south to New Jersey in the East. Originally found statewide, it declined dramatically over the past 40 years, most likely due to a combination of habitat loss and pesticide use for gypsy moth and mosquito control. These fritillaries prefer open, wet meadows, rarely entering woodlands and are double-brooded (triple-brooded in the south). Larvae feed on a variety of *Viola* species and overwinter as partially grown caterpillars, likely in the litter at the base of the foodplant (Golden 2003; D. Schweitzer, personal communication, 2013).

Ten bird species listed as SGCN breed in shrubby or emergent wetlands in the Skylands region and will use fen habitats. Of these, the **Canada warbler**, **golden-winged warbler**, **winter wren**, and **least flycatcher** are more northern species that reach their southern limit for breeding in northwestern New Jersey. The golden-winged warbler is a fen nester, preferring shrubbier sections with overgrown openings, although it will use other habitats (S. Petzinger, personal communication, 2013). Least flycatchers nest in open woodlands and shrubby areas at edges of ponds, streams, and bogs. They will use a fen edge (e.g. Hyperhumus and fens along the Wallkill River), although they are not dependent on them. Canada warblers nest on or near the ground in or along the brushy edges of wetlands with low herbaceous cover (Walsh et al. 1999). They would breed in the shrubby edge of fens (S. Petzinger, personal communication, 2013). Winter wren is a forest interior nesting species that prefers old growth forests or moist coniferous forests (Walsh et al. 1999) with snags and downed logs, typically near water. Although there are not many records in New Jersey, they also would breed in the shrubby edge of fens (S. Petzinger, personal communication, 2013).

Of all the birds listed as SGCN, the **sedge wren**, although very rare and can occur in any part of the state, is most dependent on fens in northern New Jersey. Sedge wrens nest in high marsh ecotones along the coast and in fens, bogs, and wet meadows or grasslands away from the coast. They breed in calcareous fens along the Wallkill and Black Creek and have also been observed breeding in a fen in the Paulinskill River watershed (S. Petzinger, personal communication, 2013).

The **veery** nests throughout northern New Jersey and prefers shrubby habitats in or near damp, moist habitats. They are known to breed in the fens at HyperHumus and at Wallkill (S. Petzinger, personal communication, 2013).

Black-billed cuckoo and **northern parula warbler** are found locally throughout the state. Cuckoos nest along forest edges in thickets, especially in the shrubby edges of wet areas and, while not fen-dependent, they might use the shrubby edge of a fen for nesting particularly in the Wallkill and Paulinskill areas (S. Petzinger, personal communication, 2013). Northern parula warblers typically nest in trees over water, especially in riverside floodplain forests (W. and S. Wander, personal communication, 2013) but they are known to use the edges of fens in the Paulinskill drainage as well as the Flatbrook River and other isolated fens in the Delaware Water Gap (S. Petzinger, personal communication, 2013).

Also found locally state-wide, **red-headed woodpeckers** prefer to nest in standing dead trees with an open understory. They will also use standing timber in swamps and are known breeders in fens at Johnsonburg Swamp, Whittingham Wildlife Management Area, and other larger sites with open water (S. Petzinger, personal communication, 2013).

Although not dependent on fen habitats**, American woodcock** is a game species of regional concern that may nest in early successional sedge meadows and shrub fens and/or use them during migration in the spring and fall. These birds rely on different habitat types in close proximity, requiring open fields or meadows for courtship display, second growth

hardwood stands for nesting and rearing of young, and large fields as night roosting sites (Kelley et al. 2008).

Integrated Conservation Management Guidelines:

An important goal of the SWAP is to protect, maintain, and restore critical wetland habitat for wildlife SGCN. Due to the fact that there are a number of rare taxa with varying habitat preferences that use fen habitats, there is significant potential for conflicts between conservation management actions proposed for SGCN animals and rare plants at individual sites. For this reason, it is recommended that there be a thorough survey and mapping of all rare species found at a site, including population location, status and condition, such that any proposed management can avoid or minimize impacts. Ideally, fen management must be holistic, maintaining not only the core open meadow areas but also the shrubby matrix in which the grassy areas occur.

The following integrated conservation management guidelines address broad categories linked to conservation actions identified in the SWAP and correlated with the TRACS ACTIONS Level 1. We have specifically targeted discussion around the actions where there may be potential for management incompatibility between state endangered plants and wildlife SGCN.

TRACS ACTIONS

1. Coordination and Administration
2. **Create, Restore, or Enhance Habitat and Natural Processes**
3. **Data Collection and Analysis**
4. Education
5. Facilities and Areas/New Construction
6. Facilities and Areas/Major Renovation
7. Facilities and Areas/Operations and Maintenance
8. Land and Water Rights/Acquisition and Protection
9. Law Enforcement
10. Outreach
11. Planning
12. Species Reintroduction and Stocking
13. Technical Assistance

TRACS ACTION #2:
CREATE, RESTORE, OR ENHANCE HABITAT AND NATURAL PROCESSES

Hydrology and Water Quality Management

Maintaining the integrity of important and unique natural communities is a conservation goal of the SWAP and increasing the effective size and connectivity of wetlands an important conservation action. Accomplishing these will help maintain site hydrology, which will be the key to fen longevity. Additionally, research proposed in the SWAP to

identify groundwater recharge areas for calcareous wetlands habitats would be of great benefit to the rare plants and SGCN animals using these fens.

Vegetation Management

Managing succession: Rare plants, bog turtles, the emerald dragonflies, above mentioned Lepidoptera and some birds require an early successional vegetation stage characterized by low herbaceous cover. Preventing shrub or sapling encroachment or canopy closure is critical. Maintaining open habitat can be done in a variety of ways; by selective cutting of red maples or other shrubs, with the targeted use of herbicides, or the addition of grazing animals such as goats.. These management methods are typically used, in New Jersey fens to date or have been recommended in the SWAP. In addition, the SWAP recommends researching different management techniques for maintaining early successional habitats, which would be of value to the suite of species using fens.

> Manual vegetation removal: Hand-pruning or selective cutting of woody vegetation can be used to set back succession and open the canopy for those plant and animal species that require it. If done in the winter months, there will be little impact to fen vegetation or other animal species that use the habitat.
>
> Use of Herbicides: Extreme care must be taken if herbicides are used in fen habitats as most are broad spectrum. Only direct hand application (e.g., hand painting stump cuts) should be considered for vegetation control adjacent to rare plant populations.
>
> Grazing: For degraded habitats where grazing might be used to remove common reed (*Phragmites australis*) and other invasive vegetation and restore fen-like habitat structure, a determination of which rare plants and animals remain at the site should be made and those sensitive areas fenced off from grazing and subsequent trampling. Fencing usually requires clearing of a 10-foot wide fence path and the installation of posts (B. Zarate, personal communication, 2012). Although fence construction typically occurs outside the growing season, some trampling could occur, which might affect plants, overwintering Lepidoptera larvae or odonate larvae in rivulets. Another consideration is the number of animals applied per acre. The U.S. Fish and Wildlife Service recovery plan for bog turtles (USFWS 2001) recommends one animal/acre but consultation with botanists to see if this density should be modified on a site-by-site basis, is warranted. Many plants, such as rare orchids, are particularly vulnerable to grazing pressure. (Grazers such as goats introduced to a site for bog turtle vegetation management can be in direct conflict with Schweitzer's buckmoth survival, as the goats may inadvertently consume eggs laid on stems of plants they browse or can eat so many leaves when they first emerge in the spring that there is insufficient food to support caterpillar development [D. Schweitzer, personal communication, 2012].)

Silvicultural practices on adjacent uplands: The improvement of silvicultural practices by encouraging landowners to use ecologically appropriate techniques has been identified in the SWAP as an important conservation action. Such practices would benefit both rare plants and animals in fen habitats in part by reducing erosion from surrounding uplands and protecting water quality.

Utility rights-of-way management: The SWAP recommends the development of BMPs for Rights-of-Way (ROW) management for scrub-shrub and animal species that may use them. As ROWs cut through calcareous fen habitats, the development of management guidelines should be coordinated such that all rare plants as well as wildlife SGCN using ROWs are incorporated into BMPs. This will assist the landowner in making appropriate management decisions and to avoid potentially conflicting recommendations.

Note: Maintaining appropriate wetland scrub-shrub habitat in the region has been identified in the SWAP as a priority for many breeding birds. Fens can provide this wetland scrub-shrub habitat, as there are often shrub zones in the fens and some fens are characterized by their dominance of shrubs (e.g., calcareous shrub fen and rich shrub carr). For this reason, any vegetation management plan should take into consideration the rare habitat itself and the needs of all species at a site, when possible. Some birds, like the golden-winged warbler, rely on both patches of herbaceous cover for nesting and shrub cover for foraging. In addition, Schweitzer's buckmoth larvae feed on low shrub vegetation. Maintaining shrub fens as well as both open herbaceous areas and shrub zones in other fen habitats is important to meet the habitat needs of the entire suite of plant and animal species that may occur in these habitats.

Invasive, Over-abundant, and Pest Species Management

Invasive plant species: Management and control of invasive plant species is an important conservation goal identified in the SWAP, as it is critical to maintaining the integrity of the fen habitat upon which so many rare plant and animal species depend. In particular, common reed (*Phragmites australis*), purple loosestrife (*Lythrum spicata*), and multiflora rose (*Rosa multiflora*) are often targets for removal and control. As mentioned in the vegetation management section above, control should begin with the least harmful process (hand pulling or seedhead removal) before moving toward use of chemicals or other less targeted techniques. Biocontrol may be an option for some invasive species, however consultation with experts, both botanists and zoologists is always warranted when considering the use of chemicals and/or biocontrol. Decisions should be made on a site-by-site basis to prevent (or minimize) negative impacts to non-target rare plant or animal species.

Insect pests and/or disease pathogens: A number of insect pests may be targeted for control in and around fen wetlands (e.g., mosquitoes, gypsy moths). Control measures often include application of pesticides, many of which are broad spectrum or are applied at times of the year when other invertebrates are vulnerable or are applied in a manner harmful to the rare plant community (e.g., trampling). Any proposed control measures should be site specific and the use of integrated pest management and committed, ongoing coordination

among agencies and with fen managers to reduce non-target impacts is critical. In all cases, botanists and zoologists should be included in the discussion to avoid any potential harm to rare plant or SGCN animal populations or the habitat during treatment.

Note: Proper protocols should be put into place to prevent the spread of invasive species and/or disease pathogens (e.g., Chytrid fungus, Ranavirus) among wetland sites. It is best to follow these or similar recommendations between site visits: 1) wash boots and field equipment with soap and water; 2) rinse in clean water; and 3) disinfect with a 10% bleach solution and allow to air dry (Dodd 2010; B. Zarate, personal communication, 2013).
Deer control: Management of deer populations is an important conservation goal identified in the SWAP to promote forest health and biodiversity. Deer consume rare plants, larval foodplants and nectar sources for adult Lepidoptera, alter habitat structure for nesting birds, among other impacts (Côté et al. 2004, Rawinski 2008, Schweitzer et al. 2011). Management measures may include increased hunting efforts or fencing of vulnerable habitat against deer. Managing the size of local deer herds would benefit both rare plants and animals, and any trampling of vegetation by hunters would occur when most plants are dormant.

Beaver control: Beaver control may be needed on occasion and has also been identified as a conservation action in the SWAP. Typically, this could include trapping and removing beaver from a site to prevent dam construction (or partial dam removal), and/or the installation of a water level control device. Since the rare plants and the SGCN animals all rely on a similar site hydrology, beaver control should benefit both.

Recreational Use Management

Regulating ORV and other recreational vehicle use is a goal of the SWAP and ORVs are a threat to some calcareous fen wetlands (Walz 2006). Implementation of conservation actions to either prohibit this activity or restrict use of ORVs to less sensitive areas, coupled with adequate enforcement, would benefit rare plants and animals as well as habitat integrity.

The SWAP also includes a goal to promote public education and awareness, wildlife conservation, and viewing opportunities, all worthwhile actions. However, if wildlife viewing structures or trails are planned in or near calcareous fens, care must be taken to avoid altering site hydrology, permitting unguided access into vulnerable habitat to avoid trampling, introducing invasive plant seeds, and harming sensitive plants and animals during construction.

SPECIES MANAGEMENT (= TRACS ACTION TARGETS)

Species–Specific Management Actions highlighted in the SWAP:

Silver-bordered fritillary – The SWAP identifies conservation actions for this species that include identifying critical habitat, managing for violets (the larval foodplant), and retarding succession where appropriate (see above caveats for vegetation management,

although to date no active management has been implemented). Although this fritillary is not generally a fen species (D. Schweitzer, personal communication, 2013), maintaining an intact fen community should benefit this butterfly if or when present, as well as other fen-dependent Lepidoptera species.

Red-headed woodpecker – There are two conservation actions included in the SWAP for these woodpeckers, one that recommends the use of GIS to identify wetlands with standing dead wood and the other to develop BMPs to maintain trees for nesting. Conservation actions to maintain standing dead trees in fens with the woodpeckers (e.g., in Johnsonburg Swamp) can be incorporated into ongoing vegetation management without conflict to other rare plants and animals.

Bog turtle – A number of habitat management actions are proposed in the SWAP to maintain or enhance turtle populations that could potentially conflict with other rare plant and animal species. See the earlier vegetation management discussion for details and recommendations. Other SWAP conservation actions for the bog turtle include conducting research on water quality parameters and protecting turtles from illegal collecting, neither of which would conflict with other rare plant or other animal species.

Scrub-shrub species – In addition to survey and monitoring, the SWAP recommends actions for rights-of-way (ROW) management, as many ROWs provide critical habitat for early successional bird species. If such ROWs cut through fen wetlands, care must be taken with any vegetation management measures that are applied (see vegetation management section above). Collaboration on management techniques used within ROWs may be necessary to avoid incompatibilities when managing for different species occupying the same area.

American Woodcock –The SWAP recommends increasing the number of forests that are managed to contain a mix of seral stages to benefit forest-dwelling species, including American woodcock. As long as the silvicultural practices on forests adjacent to fens are ecologically appropriate and compatible with fen conservation, this management recommendation should not be in conflict with fen plants and other SGCN animals.

TRACKS ACTION #3:
ATA COLLECTION AND ANALYSIS
RESEARCH, SURVEY OR MONITORING

Inventory and Long-term Monitoring

Inventory of all animal SGCN and long-term monitoring have been identified as priorities in the SWAP, however care must be taken when implementing survey and monitoring of fen species. Survey and monitoring for all animal and plant species requires some movement through the fens at various times throughout the season. Trampling of vegetation is a major threat to rare plant species and also to certain SGCN animals. Tramping may alter site hydrology by filling in rivulets with sediment; may crush odonate larva or newly emerged (teneral) adults and Lepidoptera larva or pupa; or harm nests of ground-nesting birds. For

these reasons, plant and animal population monitoring efforts at a site should be coordinated to prevent situations where multiple monitoring initiatives are occurring, potentially creating frequent, extensive, long-term disturbance without sufficient recovery periods. As mentioned previously, it is also recommended that there be a thorough survey and mapping of all rare species found at a site, including population location, status and condition, such that any proposed management can avoid or minimize impacts.

Animal survey and monitoring techniques – minimizing harm to rare plants:
Turtle surveys: Survey and monitoring for spotted and bog turtles would include multiple site visits between March and June, with later season visits also conducted. Substantial trampling may occur as bog turtle monitoring can be intensive, especially if radio telemetry or active trapping with drift fences are components. See above recommendation for coordination of survey work. Consult the plant phenology tables in this report and any rare species maps that are prepared for additional guidance when planning the location and timing of survey work.

Breeding bird surveys: Assessing the status of the ten bird species in these habitats would generally require multiple site visits in May and June during the breeding season, so may affect rare plants. Furthermore, if golden-winged warblers are breeding in an area, a single mist-net may be temporarily set up to capture and band them. Setting up this net may involve trampling and removing tall vegetation and branches near the net. If this is to be done in a fen, the net will most likely be set up along the edge where there are shrubs and trees to provide shade (S. Petzinger, personal communication, 2013). As above, prior to conducting bird surveys in fen habitats, consult the plant phenology tables in this report and any rare species maps that are prepared for additional guidance when planning the location and timing of survey work.

Lepidoptera surveys: Surveys for silver-bordered fritillary would typically occur during the peak flight periods of late June and August. The buckmoth flies in late September when turtles are entering overwintering sites so should not conflict with these animals, however, some rare plants may still be present into November. Planning for any Lepidoptera survey work should include consultation with plant phenology information in this report and any additional rare species maps that are available. The SWAP recommends expanding volunteer citizen scientist recruitment to conduct surveys at particular sites. It is important that reputable groups are chosen and that survey methodology be developed upfront, so that citizen scientists can avoid harming any rare plant species that might be present at the survey site.

Odonate surveys: Surveys would be conducted from May through August as Kennedy's emerald flies early in the season, in May and June while the brush-tipped emerald flies during the summer. Dragonfly and damselfly survey and monitoring at a fen could include netting of adults for identification in the hand, searching for larvae in rivulets and/or exuviae along the water's edge, and specimen collection if deemed necessary. Such activities may trample the plant community so care must be taken during survey work to avoid rare plant locations. Consultation with the plant phenology tables in this report and

any rare species maps that are prepared will help avoid harm to rare plants and other sensitive species.

Plant survey and monitoring techniques- ways to minimize harm to animals:

Plant surveys: Plant surveys and rare plant monitoring activities can occur throughout the growing season as phenology differs among species, and over multiple years since growing conditions vary from year to year. Such activities may include random searches through habitat, use of parallel transects, and/or the establishment of long-term vegetation monitoring plots.

Recommendations for plant surveys:

Impacts on ground-nesting birds can be minimized when doing plant surveys the following ways: If possible, conduct the surveys before May or after July to avoid the nesting season altogether. If surveys must be done during that time, care should be taken to stay on trails (paths, wildlife trails, etc.) whenever possible, avoid stepping on any tussock sedges (where some birds may be nesting) and try to walk through areas where vegetation is less dense (where you can see the ground when walking). If going off trail in dense grasses or forbs, use a walking stick to brush the vegetation in front of where you are walking. Doing this may make you aware of a nest in your path (flush a bird off the nest) as well as help you see the ground you are stepping on before you take the step (S. Petzinger, personal communication, 2013).

Impacts to turtles: Avoid stepping atop of raised hummocks and moss beds, particularly between May and September, where fen turtles tend to nest.

Climate Change Vulnerability Assessment

The year 2012 was the warmest on record nation-wide (NOAA 2013) and in the garden state (Robinson 2013), with more changes forecast to come. In New Jersey the effects of climate change are projected to include: an increase in average temperature (minimum 2-6 °F. increase by 2050) and precipitation (although the exact nature of the change in precipitation may vary across the state); more extreme weather events such as storms and droughts; and sea level rise. Generally we can expect more prolonged summer heat waves with temperatures above 90° F., and fewer cold days and nights during the winter, which may be of import for those species requiring cold dormancy. Rainfall, especially in the northern part of the state, may increase in amount mainly in the winter moths (Faass et al. 2012, NJ Climate Adaptation Alliance 2013a).

Fen Habitats and Climate Change:

According to Faass et al. (2012) there are a number of stressors that should be looked at to determine whether or not a particular plant community in a habitat is vulnerable to climate change. These stressors include: 1) exacerbation of other non-climate stressors; 2) specific

hydrologic conditions; 3) vulnerability to human response; 4) sensitivity to extreme climate events; 5) intrinsic adaptive capacity; 6) species vulnerability; 7) latitudinal constraints; 8) management feasibility; 9) degree of cold adaptation; and 10) location in geographical range. (For a detailed discussion of each of these stressors, see Faass et al. 2012.)

Fen wetlands are susceptible to a number of these stressors. Fens are maintained by specific hydrologic conditions that require a fairly even distribution of precipitation throughout the year. The significant alteration to precipitation patterns anticipated with a changing climate (e.g., greater flood events, increased drought during the summer months) may alter groundwater flow and seepage. This in turn will affect plant and animal species composition, favoring species adapted to drier conditions and possibly permitting greater invasive species incursion (non-climate stressor) (NJ Climate Adaptation Alliance 2013b). Although fen communities are found wherever there is karst topography, the type of fens found in New Jersey are of northern affiliation and many plant and animal species within them are also at the southern edge of their range, making them more vulnerable to changing climate. Responses of these species to predicted warming trends may include a range contraction or shift northward.

Species and Climate Change:

Plants: Using the NatureServe Climate Change Vulnerability Assessment (CCVA) model (NatureServe 2011), state endangered plants in New Jersey calcareous fen habitat were assessed for climate vulnerability (Ring and Spencer 2013). Two sedges, Tuckerman's sedge (*Carex tuckermanii*) and cyperus-like sedge (*Carex pseudocyperus*) were considered highly vulnerable to a changing climate (both are at the extreme southern edge of their range). Most calcareous fen state endangered plant species (21 species, 75%) were considered moderately vulnerable, with the main factors being their location at the southern edge of their range and their inability to tolerate warmer conditions and altered hydrologic regime. In addition, calcareous wetland connectivity may not be sufficient to allow movement in response to climate changes. Only five plant species were presumed stable. See Ring and Spencer (2013) for more detailed discussion.

Animals: New Jersey's SGCN animals have not yet been assessed for vulnerability to climate change. However, some predictions can be made about how they would fare in future years given a warming climate by consultation with experts and other species assessments.

Although no CCVAs were conducted for these particular rare **butterflies and moths**, Lepidoptera depend on the presence of their larval food plants for survival. Climate-induced alterations to fen wetlands that change hydrology and species composition could affect persistence of these insects. A key threat to Mitchell's satyr (should any undiscovered populations persist in New Jersey) might be succession of wetland habitat such that the sedges that the larvae feed on are no longer available.

In contrast, buckmoth larvae feed on shrubby cinquefoil, bog birch, and willow, all of which have been determined to be 'presumed stable' by Ring and Spencer (2013). As long as other critical habitat characteristics remain in place (site hydrology, presence of *Sphagnum* pupation sites, etc.) the buckmoth may persist, although a more thorough assessment is needed before any stronger predictions can be made.

Silver-bordered fritillary have been declining in recent years, particularly at the southernmost edge of their range in the Washington D.C. area, and in southern New Jersey, and it is likely that the climate change that is already occurring and its associated erratic hydrologic regimes have been contributing factors (D. Schweitzer, personal communication, 2013). Silver-bordered fritillary feed on violets, although it is unknown if they require a particular species of *Viola*. CCVAs were not conducted on *Violas*. Given that New Jersey is located at the southeastern-most extent of the fritillary's range and that its range has contracted dramatically in recent years, it is possible that this species will disappear from the state in the future regardless of species management efforts and future climate change impacts.

There are other fen Lepidoptera that may be affected by climate change that were not included in the SWAP when originally written. These include northern populations of Dion skipper (*Euphyes dion*) that rely on calcareous wetlands, the eyed brown (*Satyrodes eurydice*) found at one or two fen sites in this region, (D. Schweitzer, personal communication, 2013), and the Acadian hairstreak (*Satyrium acadica*) (W. & S. Wander, personal communication, 2013). Future updates to the SWAP may want to consider these species for inclusion.

Both **dragonflies** also rely on a specific site hydrology. Although no CCVAs were prepared for these two species, it is likely that their ranges will also contract northward with a warming climate as they are at their southern limit and dependent on cold water habitats (A. Barlow, personal communication, 2013).

Bog and spotted turtles: CCVAs were conducted for bog turtles and spotted turtles by both New York State and Pennsylvania. Bog turtles are considered by both states to be extremely vulnerable to climate change. The key factors contributing to this extreme vulnerability include their specialized habitat requirements (site hydrology), spotty distribution on the landscape, excessive collecting pressure, and poor dispersal ability (Furedi et al. 2011, Schlesinger et al. 2011). It is likely that New Jersey bog turtle populations also would be considered extremely vulnerable as the same factors apply. Spotted turtles were considered moderately vulnerable in Pennsylvania and presumed stable in New York, their lower level of vulnerability likely due in part to the fact that they are not restricted to calcareous wetlands and can use a variety of wetland habitats and that the NY/PA/NJ populations are at the center of the species' range. Although is it not known how sex is determined in bog turtles, many other turtles like the spotted turtle have temperature-dependent sex ratios, which might be altered with a changing climate. Creating and maintaining wetland connectivity in the future is vital to the persistence of viable populations of these turtle species.

Scrub-shrub nesting birds: No CCVAs were prepared for these species in New Jersey. Over time, the more northern affiliate species will likely disappear as breeders in the state as their ranges contract northward. However, a CCVA prepared in Pennsylvania for golden-winged warblers considered them not vulnerable, and likely to increase in that state (Furedi et al. 2011). Since most birds are more mobile and can move longer distances (in contrast to plants and other animals like salamanders), are not overly sensitive to temperature, and have a more generalized diet, some species may be less affected by climate change so long as sufficient habitat exists and they are not negatively affected by other competing species expanding their ranges northward into New Jersey (Furedi et al. 2011). However, a phenological mismatch, where the arrival of some migratory birds to their breeding habitat earlier in the season may put them out of synch with their invertebrate food supply, could be a problem. Generalized predictions for all scrub-shrub nesting birds are difficult to make, especially when the entire range of the species is not included in the CCVA (Furedi et al. 2011).

Climate Change Summary

Fen habitats, as well as the species most closely tied to site hydrology (i.e., bog turtles, some butterflies, and plants) are highly vulnerable to climate change. Due in part to their mobility, most of the SGCN birds covered in this report may be less vulnerable and able to find and use other early successional wetland habitats in northern New Jersey.

Maintaining site hydrology and providing calcareous wetland connectivity are the most important conservation actions in light of climate change. Maintaining wetland landscape connectivity will be crucial so that movement can occur among wetland habitats as the fen landscape changes. Typically, mobile animal fen species such as turtles and some butterflies move among habitats and colonize new habitats via stream corridors or other wetland linkages. Rare plants also move among wetlands, their propagules dispersed by water or by animals (e.g., carried as seeds or other propagules on feet or fur). Such networks of wetlands are necessary to allow movement and gene flow among populations of rare plants, bog turtles, or other species and must extend across state boundaries. Of import is linking geophysical settings, enhancing connectivity of wetlands on calcareous bedrock and following these geologic corridors into nearby New York and Pennsylvania (Anderson and Ferree 2010). Regional conservation assessments and collaboration will be essential, as species and habitat ranges shift.

No species-focused SGCN animal management actions have been identified in the 2008 SWAP to address climate change. Calcareous fen habitat and species management actions currently outlined in the SWAP should continue, modified as needed by the recommendations in this report.

Addressing existing hydrology and water quality issues, invasive species, recreational overuse, and other threats as necessary to maintain or restore existing habitat will be key to resiliency. The ability of fen habitats to withstand change over time while retaining their basic structure and function will enable them to support viable populations of rare plants and wildlife SGCN into the future (Anderson and Ferree 2010).

Overall Conclusions

While there are some areas of potential conflict in fen species management, generally it appears that with regular communication and coordination among land managers, botanists, and zoologists, calcareous fen habitats can be successfully managed for wildlife SGCN and the rare plants.

In addition, we recommend that an assessment of species and threats to calcareous fens in New Jersey on both public and private lands be conducted as there are many landowners actively managing their fens for single species (e.g., bog turtles) who may be unaware of the rare plants that may also be found in those habitats. Ultimately, some fens might be best managed for a single species, such as for bog turtles, while others could be successfully managed for a suite of fen-dependent species but a full review of all sites is critical before such determinations can be made.

Integrated Management Guidelines: Calcareous Sinkhole Pond Habitat

Appalachian Mountain Boltonia *(Boltonia montana);* Calcareous Sinkhole Pond*;* Long-tailed Salamander *(Eurycea longicauda longicauda)*

Overview

Calcareous sinkhole ponds and their associated rare plant communities are wetlands that occur on calcareous bedrock at the ground-water interface (Walz et al. 2000). In New Jersey, these ponds are found predominantly in the northwestern part of the state in the Appalachian valley and ridge province (Sussex and Warren counties). Typically, these ponds fill with water in winter and early spring. During the summer, as the water table drops, a diverse plant community develops on the pond shore, supporting numerous rare species. In addition, these pondshore habitats themselves are rare throughout their range and in fact, there are several types that are found only in New Jersey and nowhere else in the world (Walz et al. 2000). There are six different calcareous sinkhole pond ecological community types found in New Jersey, but for the purposes of this report we are addressing sinkhole ponds as a habitat system, not focusing just on one particular pond type.

They are included in the NE Wildlife habitat classification system as Central Interior Highlands and Appalachian Sinkhole and Depression Pond; in the New Jersey Landscape Map as Forest and Wetland Species-Based Habitat, and Vernal Habitat; and mapped in the New Jersey Land Use/Land Cover as Herbaceous Wetlands, Deciduous Wooded Wetlands and Mixed Forest Wetlands (Deciduous Dominant).. See Appendix B for more details on habitat classification.

Thirteen (13) state endangered plant species occur in calcareous sinkhole ponds, including Large Water-plantain (*Alisma triviale*), Appalachian Mountain Boltonia (*Boltonia montana*), Cloud Sedge (*Carex haydenii*), Hop-like Sedge (*Carex lupuliformis*), Small Floating Manna Grass (*Glyceria borealis*), Larger Canadian St. John's Wort (*Hypericum majus*), Water-marigold *(Megalodonta beckii*), Lake Water-cress (*Neobeckia aquatic*), Wiry Panic Grass (Panicum flexile), Arum-leaf Arrowhead (*Sagittaria cuneata*), Torrey's Bulrush (*Schoenoplectus torreyi*), Small Burr-reed (*Sparganium natans*), Lesser Bladderwort (*Utricularia minor*). See Appendix A for a complete list of state endangered plant species with rarity rankings.

The ponds also provide important breeding habitat for three rare salamanders identified as Species of Greatest Conservation Need (SGCN) in the 2008 New Jersey State Wildlife Action Plan (SWAP). They include Jefferson (*Ambystoma jeffersonianum*), marbled (*Ambystoma opacum*), and long-tailed (*Eurycea longicauda longicauda*) salamanders.

Threats:

General threats to the calcareous sinkhole pond habitats include changes to hydrology and to water quality and chemistry due to adjacent residential and commercial development or agriculture. These ponds rely on groundwater connection and this region of karst is very susceptible to changes in groundwater flow if development or agriculture intentionally or unintentionally diverts underground flow away from a wetland. (Karst systems are complex, and wetlands may be linked hydrologically underground even if no surface connection is evident.)

Ponds require significant habitat buffer around them to ensure water quality. In ponds adjacent to roads, the use of deicing salts and ensuing runoff alters pond chemistry. This not only affects rare plants adapted to the calcareous water chemistry of the ponds but also adversely affects amphibian development. Road traffic is also a source of significant mortality for mole salamanders and other amphibians as they cross roads to reach the ponds during the breeding season.

Other threats include invasive species, in particular nonnative plants such as purple loosestrife (*Lythrum salicaria*), Japanese stiltgrass (*Microstigium vimineum*), common reed (*Phragmites australis)*, Japanese knotweed (*Polygonum persicaria)*, garlic mustard (*Alliaria petiolata),* and Japanese barberry (*Berberis thunbergii*), which affect the integrity of the sinkhole pond habitat or its calcareous upland buffer. In larger ponds, recreational activities such as shoreline fishing or boating access that tramples sensitive pondshore vegetation can be a problem. The use of off-road vehicles (ORVs) and 4WD access in some ponds crushes plants and compacts the soil, while hiking trails placed adjacent to a pond edge with sensitive vegetation also can threaten the rare plant community and inadvertently introduce invasive species carried on shoes from other nearby sites. Onsite and offsite use of herbicides and pesticides also may harm nontarget plants or animals (Walz et al. 2000).

A summary of CMP Threats to state endangered plants and wildlife SGCN in calcareous sinkhole pond habitat is found in Appendix C.

Species Ecology

Plants:

Calcareous sinkhole ponds support a distinctive flora with significant populations of rare plants species that prefer calm shallow waters. Many are calcicoles found only in calcareous habitats, such as *Chara* spp*., Carex cryptolepis, Carex viridula*, and hop-like sedge (*Carex lupuliformis)* (Walz et al. 2000). Most are adapted to seasonal flooding and drying, even requiring a seasonal natural drawdown for reproduction and/or seed germination.

For example, many Carex species require exposed mud for seed germination and bare, moist mud also facilitates rooting of the stem and leaf fragments of lake water-cress (*N. lacustris*).

Boltonia montana has a very restricted range, found only in New Jersey and Delaware and likely extirpated from Pennsylvania. Of the twelve rare plants identified from sinkhole ponds and that are covered in this report, seven reach their southern limit in New Jersey. These include arum-leaf arrowhead (*Sagittaria cuneata*), large water-plantain (*Alisma triviale*), water-marigold (*Megalodonta beckii*), small floating manna grass (*Glyceria borealis*), cloud sedge (*Carex haydenii*), small burr-read (*Spharganium natans*), and lesser bladderwort (*Utricularia minor*). Others are found at mid-range for the species overall (e.g. wiry panic grass [*Panicum flexile*], Torrey's bulrush [*Schoenoplectus torreyi*], lake water-cress [*Neobeckia lacustris*], hop-like sedge [*Carex lupuliformis*]), but are rare due to the limited distribution of the calcareous sinkhole pond habitat in New Jersey.

The following two tables provide a list of state endangered species that can found in calcareous sinkhole ponds in New Jersey with their phenology, or timing of vegetative, flowering and fruiting, and comments on their habitat/niche. The phenology and habitat information can be used to help avoid negative impacts to these state endangered plant species during wildlife surveys and management activities.

FL = Flowering; FR = Fruiting; V = Vegetative

Phenology of State Endangered Plant Species in Calcareous Sinkhole Pond Habitat

		APRIL		MAY		JUNE		JULY		AUG		SEPT		OCT		NOV	
Scientific Name	**Common Name**	**1-15**	**16-30**	**1-15**	**16-31**	**1-15**	**16-30**	**1-15**	**16-31**	**1-15**	**16-31**	**1-15**	**16-30**	**1-15**	**16-31**	**1-15**	**16-30**
Alisma triviale	Large Water-plantain								FL	FL	FL, FR	FL, FR	FL, FR	FR	FR		
Boltonia montana	Appalachian Mountain Boltonia									FL	FL	FL, FR	FL, FR				
Carex haydenii	Cloud Sedge			FL	FL, FR	FR	FR										
Carex lupuliformis	Hop-like Sedge						FL	FL	FR	FR	FR	FR	FR	FR			
Glyceria borealis	Small Floating Manna Grass					FL	FL, FR	FR									
Hypericum majus	Larger Canadian St. John's Wort								FL	FL	FL, FR	FL, FR	FL, FR	FR			
Megalodonta beckii	Water-marigold								FL	FL	FL, FR	FL, FR	FL, FR	FL, FR	FR		
Neobeckia aquatic	Lake Water-cress								FL, FR	FL, FR	FL, FR	FR					
Panicum flexile	Wiry Panic Grass									FL	FL, FR	FR	FR	FR			
Sagittaria cuneata	Arum-leaf Arrowhead						FL	FL	FL, FR	FL, FR	FL, FR	FL, FR	FR	FR			
Schoenoplectus torreyi	Torrey's Bulrush								FL	FL, FR	FL, FR	FR	FR	FR			
Sparganium natans	Small Burr-reed									FR	FR	FR					
Utricularia minor	Lesser Bladderwort					FL	FL	FL	FL	FL							

SOURCE: New Jersey Natural Heritage Program, Biotics Database

Calcareous Sinkhole Pond -- State Endangered Plant Habitat/Niche Comments

Scientific Name	**Common Name**	**Habitat/Niche Comments**
Alisma triviale	Large Water-plantain	Shallow water of limestone sinkhole pond, often dominant in patchy mosaic, muddy substrate.
Boltonia montana	Appalachian Mountain Boltonia	Upper pondshores of calcareous sinkhole ponds, on silt over dolomite or rarely on marly peat.
Carex haydenii	Cloud Sedge	Upper pondshores of calcareous sinkhole ponds, on silt over dolomite, often stony.
Carex lupuliformis	Hop-like Sedge	Upper pondshores of calcareous sinkhole ponds in shallow water; open to partial shade (often under trees at edge of pond).
Glyceria borealis	Small Floating Manna Grass	Shallow water of calcareous sinkhole ponds, often in wet mote around edge of ponds.
Hypericum majus	Larger Canadian St. John's Wort	Wet marl or calcareous soils of fens and sinkhole ponds.
Megalodonta beckii	Water-marigold	Shallow water of calcareous sinkhole ponds, usually growing in mucky substrate.
Neobeckia aquatica	Lake Water-cress	Open water in marl ponds and calcareous lakes.
Panicum flexile	Wiry Panic Grass	Upper pondshores of calcareous sinkhole ponds, on marl or rocky dolomitic silt.
Sagittaria cuneata	Arum-leaf Arrowhead	Shallow water of limestone sinkhole pond, often dominant in patchy mosaic, mucky substrate.
Schoenoplectus torreyi	Torrey's Bulrush	Shallow water of limestone sink hole ponds, mucky substrate.
Sparganium natans	Small Burr-reed	Grows on muddy bottom or in shallow water of a calcareous sinkhole pond.
Utricularia minor	Lesser Bladderwort	Grows in shallow, calcareous water of marshes, pond shores, and marl fens.

SOURCE: New Jersey Natural Heritage Program, Biotics Database

Animals:

The three animal species of greatest conservation need identified in the 2008 State Wildlife Action Plan that use sinkhole ponds are amphibians, specifically salamanders (Jefferson, marbled, and the long-tailed salamander). Both Jefferson and marbled salamanders are mole salamanders, so named as they spend most of the year in underground retreats in forested uplands surrounding their breeding ponds (Petranka 1998). Mole salamanders breed in sinkhole ponds, taking advantage of the ephemeral nature of these wetlands and the fact that ponds typically dry out during the summer months. This drying out period reduces predation pressure from fish and other predators that require permanent water (Colburn 2004). **Jefferson salamanders** migrate to these sinkhole ponds in late winter/early spring, mate, and deposit their eggs in small clusters attached to vegetation in the water. In contrast, **marbled salamanders** migrate to the ponds in the fall. Females deposit their eggs under leaves, moss, or fallen woody debris in the dry pond basin. The females typically guard the clutch from predators until the ponds refill with water later in the season (Kenney and Burne 2000). Regardless of when the adults arrive at the ponds, once the larvae of either salamander species hatch they must complete metamorphosis before the ponds dry out in early summer.

Long-tailed salamanders are less dependent on the ephemeral hydrology of sinkhole ponds, overwintering in connected seepages and underground crevices and caves. Adults emerge from these overwintering sites in late April/early May. During the summer, they also depend on wooded buffer around breeding ponds (and in certain areas they use adjacent rocky seepage areas) but typically do not venture far from water. They return to underground aquatic retreats in the fall, and mate and lay eggs overwinter. Larvae metamorphose in June and July (Kenney and Burne 2000).

Integrated Conservation Management Guidelines

The following integrated conservation management guidelines address broad categories linked to conservation actions identified in the SWAP for SGCN animals that use calcareous sinkhole pond habitats. They are also correlated the TRACS ACTIONS Level 1. We have specifically targeted discussion around the actions where there may be potential for management incompatibility between rare plants and SGCN animals. An important first step in the planning process would be to conduct a thorough survey and mapping of all rare plant and animals species found at a site, including population location, status and condition, such that any proposed management can avoid or minimize impacts.

TRACS ACTIONS
1. Coordination and Administration
2. Create, Restore, or Enhance Habitat and Natural Processes
3. Data Collection and Analysis
4. Education
5. Facilities and Areas/New Construction
6. Facilities and Areas/Major Renovation
7. Facilities and Areas/Operations and Maintenance
8. Land and Water Rights/Acquisition and Protection
9. Law Enforcement
10. Outreach
11. Planning
12. Species Reintroduction and Stocking
13. Technical Assistance

TRACS ACTION #2:
CREATE, RESTORE, OR ENHANCE HABITAT AND NATURAL PROCESSES

Hydrology and Water Quality Management

The protection of water quality in critical wetlands and other aquatic habits for target animal species is an overarching goal identified in the 2008 SWAP in particular, preserving the ecological quality and integrity of vernal pool communities. Management that ensures maintenance of pond hydroperiod and water quality (e.g., limiting development near the ponds and regulating use of road salts) would benefit all taxa. The Jefferson salamander is particularly vulnerable to habitat acidification (Sadinski and Duncan 1992), as are the rare plants in sinkhole pond habitats.

Research to identify groundwater recharge areas (recommended in the SWAP) also would benefit both rare plants and animals at these sites.

Vegetation Management:

Managing succession: Shrub or sapling encroachment has not been identified as a significant threat to the rare plant community in New Jersey's calcareous sinkhole ponds to date (Walz et al. 2000), or to salamander SGCN although targeted invasive plant species control may be necessary at some sites (see below). So long as the site hydrology remains intact, there should be minimal woody vegetation management needed in calcareous ponds.

> Manual vegetation removal: Hand-pruning or selective cutting of woody vegetation can be used to set back succession and open the canopy for those plant and animal species that require it. If done in the winter months, there will be little impact to pond vegetation or other animal species that use the habitat.
>
> Use of herbicides: Extreme care must be taken if herbicides, especially broad spectrum are used in calcareous sinkhole pond habitats. Only direct hand application (e.g., hand painting stump cuts) should be considered for vegetation control adjacent to rare plant populations.

Silvicultural practices on adjacent uplands: The SWAP includes recommendations to promote ecologically sound silvicultural practices on critical upland habitats and wetland buffers. This would certainly be of benefit to rare plant and animal species that rely on pristine pond water quality and appropriate pond chemistry. In addition, the quality of the surrounding forest habitat is critically important to mole salamanders, which spend 11 months of the year there.

Utility rights-of-way management: The SWAP recommends the development of BMPs for Rights-of-Way (ROW) management for scrub-shrub and other species that may use them. As ROWs occasionally cut through calcareous sinkhole pond habitats, the development of management guidelines should be coordinated such that all rare plants as well as wildlife SGCN using ROWs are incorporated into BMPs. This will assist the landowner in making appropriate management decisions and to avoid potentially conflicting recommendations.

Invasive, Over-abundant, and Pest Species Management:

Invasive plant species: Management and control of invasive plant species is an important conservation goal identified in the SWAP and a priority in the Skylands zone, although there were no specific invasive plant species control actions proposed to improve habitat for salamanders. However, a number of invasive plant species, in particular purple loosestrife (*Lythrum spicata*), reed canary grass (*Phalaris arundinacea*), common reed (*Phragmites australis*) and Eurasian water-milfoil (*Myriophyllum spicatum*)pose significant threat to the habitat itself (e.g., Spring Lake at Swartswood State Park), as well as to rare plant populations. Should new invasive plant populations become established, control

should begin with the least harmful process (hand pulling or seedhead removal) before moving toward use of chemicals or other less targeted techniques. Biocontrol may be an option for some invasive species, however consultation with experts, both botanists and zoologists is always warranted when considering the use of chemicals and/or biocontrol. Decisions should be made on a site-by-site basis to prevent (or minimize) negative impacts to non-target rare plant or animal species.

Deer control: The management of deer populations is a major conservation action identified in the SWAP to promote forest health and biodiversity. Management measures may include increased hunting efforts or fencing of vulnerable habitat against deer. Managing the size of local deer herds would benefit both rare plants and SGCN animals in ponds and upland forest buffer areas, and any trampling of vegetation by hunters would occur when most plants are dormant. Although deer have not yet been identified as a significant problem in calcareous sinkhole pond habitats for either plants or SGCN animals, browsing activity should be regularly monitored.

Beaver control may be needed on occasion and has also been identified as a conservation action in the SWAP. Typically this could include trapping and removing beaver from a site to prevent dam construction (or partial dam removal), and/or the installation of a water level control device. Since the rare plants and the salamanders in sinkhole pond habitats all rely on a similar pond hydrology, beaver control should benefit both.

Insect pests and/or disease pathogens: Insect pests may be targeted for control in and around calcareous sinkhole ponds (e.g., mosquitoes, gypsy moths). Control measures often include application of pesticides, many of which are broad spectrum or are applied at times of the year when other invertebrates are vulnerable or are applied in a manner harmful to the rare plant community (e.g., trampling). Any proposed control measures should be site specific and the use of integrated pest management and committed, ongoing coordination among agencies and with pond managers to reduce non-target impacts is critical. In all cases, botanists and zoologists should be included in the discussion to avoid any potential harm to rare plant or SGCN animal populations or the habitat.

Note: Proper protocols should be put into place for all field biologists to prevent the spread of invasive species propagules and/or disease pathogens (e.g. Chytrid fungus, Ranavirus) among wetland sites. It is best to follow these or similar recommendations between site visits: 1) wash boots and field equipment with soap and water; 2) rinse in clean water; and 3) disinfect with a 10% bleach solution and allow to air dry (Dodd 2010; B. Zarate, personal communication, 2013).

Recreational Use Management

Although most calcareous sinkhole ponds are small and fishless, boating and shoreline fishing are popular activities at the larger sinkhole ponds in New Jersey such as Swartswood Lake (Walz et al. 2000). Without safeguards, these activities can inadvertently harm sensitive rare plants such as Appalachian Mountain Boltonia (*Boltonia montana*) and contribute to the spread of invasive species or pathogens from one pond to another. Use of

ORVs and other recreational vehicles also threaten certain sinkhole pond wetlands and regulating their use is a goal of the SWAP. Implementation of conservation actions to manage and/or restrict such activities in sensitive areas as appropriate, coupled with adequate enforcement, would benefit rare plants and wildlife SGCN.

Promoting public education and awareness, wildlife conservation, and viewing opportunities is an important goal of the SWAP. However, if wildlife viewing structures or trails are planned for construction in or near calcareous sinkhole ponds, care must be taken to avoid altering site hydrology, permitting unguided access into vulnerable habitat to avoid trampling and introducing invasive plant seeds, and harming sensitive plants and animals during construction.

SPECIES MANAGEMENT (= TRACS ACTION TARGETS)

Species-Specific Management Actions (Highlighted in the SWAP):

Salamanders: SWAP recommendations for the rare salamanders are general, addressing the need to protect critical habitat for these species. Salamanders require significant forested habitat around breeding ponds. Protection of this intact woodland buffer also benefits pond vegetation by reducing runoff and maintaining water quality. Onsite management for salamanders might entail allowing woody debris to accumulate on the forest floor (with perhaps the addition of cover boards), which would not negatively affect pond vegetation.

Active management for mole salamanders (and other herps) identified in the SWAP also includes monitoring road crossings during salamander migration to the breeding ponds. This typically occurs during rainy evenings in late winter/early spring, which should not affect the plant community at the pond. [Note: there is a Conserve Wildlife Foundation of New Jersey proposal to construct a road crossing culvert at one salamander breeding population at Swartswood State Park. Care must be taken to survey and map any locations of rare plants to avoid tramping and to prevent runoff from entering the wetland during and after construction.]

The SWAP also recommends conducting research that looks at the effects of various water quality parameters on salamanders identified as SGCN. Perhaps any proposed research initiatives could be broadened to include rare plants that are a significant part of the sinkhole pond community.

TRACS ACTION #3:
DATA COLLECTION AND ANALYSIS (TRACS Action Level 1)
***Research, Survey, or Monitoring* (TRACS Action Level 2)**

Inventory and Long-term Monitoring
Inventory and long-term monitoring of all animal SGCN have been identified as priorities in the SWAP. A good first step should be a vegetation assessment that maps the locations of rare plants such that future amphibian or other animal surveys can avoid locations of

sensitive plant populations. In addition, plant and animal population monitoring efforts at a site should be coordinated to prevent situations where multiple monitoring initiatives are occurring, potentially creating frequent, extensive, long-term disturbance without sufficient recovery periods.

Animal survey and monitoring techniques – minimizing harm to rare plants:

Vernal pool habitat surveys: Surveying for vernal pools has been identified in the SWAP as a priority. While this habitat is classified as "Eastern Woodland Vernal Pool Sparse Vegetation" in the National Vegetation Classification, in NJ calcareous sinkhole ponds are considered to be vernal pool habitat by the Division of Fish and Wildlife. "Vernal habitat" is defined in the NJDEP Freshwater Wetlands Protection Act as a wetland or State open water that meets four criteria including 1) confined basin depression without permanent flowing outlet, 2) evidence of breeding by one or more species of obligate and/or facultative fauna adapted to reproduce in ephemeral aquatic conditions, 3) maintains ponded water for at least two continuous months between March and September of a normal rainfall year, and 4) is free of reproducing fish populations throughout the year, or dries up at some time during a normal rainfall year. See Appendix E for more details and a list of vernal habitat obligate and facultative species. More information can also be found at. Much work has already been done with the use of remote sensing, followed by site visits to verify pond presence (see http://www.nj.gov/dep/fgw/ensp/vernalpool.htm). Typically, site visits to ground-truth remotely-sensed data are easiest to do in the winter when ponds are full of water (or frozen) and there is no ground cover so generally there would be little or no impact to the rare plant community. Site visits in the spring to confirm the presence of obligate wetland species (e.g., wood frogs, fairy shrimp) should also occur early enough in the season to avoid trampling rare plants.

Mole salamander surveys: Typically, survey and monitoring of mole salamander breeding at ponds occurs in the early spring and care is taken to minimize tramping in the pond to not harm salamander eggs (Heyer et al. 1994). This is well before any of the target rare plant species would have emerged so should not conflict. Follow-up survey for larvae (dip-netting) may occur later in the spring when plants may have begun growth. Adult salamanders are surveyed by searching under logs or cover boards adjacent to the pond edge and in the upland forest. When surveying for mole salamanders, avoid trampling areas of exposed vegetation or uprooting plants if using dip nets. When placing cover boards, avoid covering rare plants at pond edge or in upland areas. Consult the plant phenology tables in this report and any rare species maps that are prepared for additional guidance when planning the location and timing of survey work.

Long-tailed salamander surveys: Surveys for long-tailed salamanders usually occur later in the season when plants might be actively growing. Dip-netting for larvae, searching for adults under logs or cover boards adjacent to the pond edge, or searching seepage areas in outcrops away from the pond are all standard techniques. When conducting surveys for long-tailed salamanders, avoid trampling areas of exposed vegetation or uprooting plants if using dip nets. When placing cover boards to avoid rare plants at pond edge or in upland

areas. Consult the plant phenology tables in this report and any rare species maps that are prepared for additional guidance when planning the location and timing of survey work.

Plant survey and monitoring techniques- ways to minimize harm to animals:

Plant surveys: Plant surveys and rare plant monitoring activities can occur throughout the growing season as phenology differs among species, and over multiple years since growing conditions vary from year to year. Such activities may include random searches through habitat, use of parallel transects, and/or the establishment of long-term vegetation monitoring plots. There are no anticipated impacts to SGCN salamanders by plant surveying in calcareous sinkhole ponds.

Climate Change Vulnerability Assessment

The year 2012 was the warmest on record nation-wide (NOAA 2013) and in the garden state (Robinson 2013), with more changes forecast to come. In New Jersey the effects of climate change are projected to include: an increase in average temperature (minimum 2-6 °F. increase by 2050) and precipitation (although the exact nature of the change in precipitation may vary across the state); more extreme weather events such as storms and droughts; and sea level rise. Generally we can expect more prolonged summer heat waves with temperatures above 90° F., and fewer cold days and nights during the winter, which may be of import for those species requiring cold dormancy. Rainfall, especially in the northern part of the state may increase in amount mainly in the winter months (Faass 2012, NJ Climate Adaptation Alliance 2013a).

Calcareous Sinkhole Ponds and Climate Change:

According to Faass et al. (2012) there are a number of stressors that should be looked at to determine whether or not a particular plant community is vulnerable to climate change. These stressors include: 1) exacerbation of other non-climate stressors; 2) specific hydrologic conditions; 3) vulnerability to human response; 4) sensitivity to extreme climate events; 5) intrinsic adaptive capacity; 6) species vulnerability; 7) latitudinal constraints; 8) management feasibility; 9) degree of cold adaptation; and 10) location in geographical range. (For a detailed discussion of each of these stressors, see Faass et al. 2012.)

Calcareous sinkhole ponds are susceptible to a number of these stressors. These ponds are maintained by specific hydrologic conditions that require a fairly even (predictable) distribution of precipitation throughout the year. The significant alteration to precipitation patterns anticipated with a changing climate (e.g., greater flood events, increased drought during the summer months) may alter groundwater flow and seepage. This in turn will affect plant and animal species composition, favoring species adapted to drier conditions and possibly permitting greater invasive species incursion (non-climate stressor) (NJ Climate Adaptation Alliance 2013b).

Species and Climate Change:

Plants: All thirteen state endangered plant species present at calcareous ponds were assessed for vulnerability to climate change (see Ring and Spencer 2013), using the NatureServe Climate Change Vulnerability Assessment (CCVA) model (NatureServe 2011). Three species of rare plants (cloud sedge [*Carex haydenii*], small floating manna grass [*Glyceria borealis*] and Torrey's bulrush [*Schoenoplectus torreyi*]) were considered highly vulnerable, six (46%) were determined to be moderately vulnerable, two were presumed stable, and for two others there was not enough data to make an assessment. Although there are some exceptions based on individual life history characteristics, many of the most vulnerable are the plant species that are currently at the southern edge of their range. See Ring and Spencer (2013) for detailed discussion.

Animals: New Jersey's SGCN animals have not yet been assessed for vulnerability to climate change. However, some predictions can be made about how they would fare in future years given a warming climate by consultation with experts and species assessments from other states.

Salamanders: Climate change vulnerability analyses (CCVAs) were not conducted for New Jersey populations of the amphibian species. However, we did consult with both the long-tailed and marbled salamander CCVAs completed by the New York Natural Heritage Program and the Jefferson salamander CCVA completed by the Pennsylvania Natural Heritage Program. Long-tailed salamanders were presumed stable in New York, perhaps as they are more tied to ground water habitats that are potentially less likely to dry out. They can also use a wider array of habitats including some swamps and stream seepages in addition to sinkhole ponds. Their status in New Jersey would likely be similar to New York's vulnerability assessment.

In contrast, marbled salamander was listed as highly vulnerable in New York, due to its lack of mobility and specific habitat needs (Schlesinger et al. 2011). Because marbled salamanders are found statewide in New Jersey, a CCVA model might have come out differently, with them being only moderately vulnerable. They still would have limited dispersal capability and dependence on specific hydrology in their habitat, making them sensitive to any climate-linked alterations to site hydrology.

In the Pennsylvania assessment, Jefferson salamander was found to be highly vulnerable in that state mainly due to its limited dispersal capacity and its physical habitat requirements (e.g., vernal pools of specific pH range) (Furedi et al. 2011). It is likely that Jefferson salamander would also be ranked highly vulnerable in New Jersey for similar reasons and due to the fact they have a limited distribution in New Jersey, being restricted to the northern part of the state.

The key unifying threat exacerbated by a changing climate for the most vulnerable plant and animal species is altered hydrology and lowering of water table such that ponds no longer retain sufficient (or any) water. Preventing further drawdown from nearby wells is important, yet remains a challenge in the fractured limestone belt where sinks and springs

appear and disappear. Limestone sinkhole ponds that become disconnected from groundwater are most likely to change hydrology, to the detriment of wetland-dependent plants and mole salamanders. Although the larval period has some plasticity, there is a limit to how shortened it could be for successful transformation to the adult stage.

Climate Change Summary

Calcareous pond habitats as well as the species most closely tied to site hydrology and water chemistry (i.e., certain rare plants and mole salamanders) are highly vulnerable to climate change. Maintaining site hydrology and providing calcareous wetland connectivity are the most important conservation actions in light of climate change. Maintaining or enhancing landscape connectivity among pond sites will allow dispersing salamander juveniles to colonize other suitable pond habitats. Similarly, such connectivity of calcareous wetland habitat could allow for plant population movement via seed or other dispersal mechanisms to new or more suitable habitat as the climate changes. These landscape connections must also link geophysical settings, following limestone corridors across state boundaries to allow for northward migration of habitat or species (Anderson and Ferree 2010). Regional conservation assessments and collaboration will be essential, as species and habitat ranges shift.

Apart from this, no specific wildlife SGCN management actions have been identified in the 2008 SWAP to address climate change. The wildlife SGCN management actions currently outlined in the SWAP should continue, modified as needed by the recommendations in this report. Addressing existing hydrology and water quality issues, invasive species, recreational overuse, and other threats as necessary to maintain or restore existing habitat will be key to resiliency. The ability of calcareous sinkhole ponds habitats to withstand change over time while retaining their basic structure and function will enable them to support viable populations of rare plants and wildlife SGCN into the future (Anderson and Ferree 2010).

Overall Conclusions:

Overall, there appears to be relatively little conflict between conservation management actions proposed for rare salamanders in the 2008 SWAP and rare plant survival in calcareous sinkhole pond habitats. These ponds and their associated plant and animal species share similar threats and have similar management needs.

Integrated Management Guidelines: Pine Barren Savanna Habitat

Bog asphodel (*Narthecium americanum*); Pine Barren Riverside Savanna; Bog lemming (*Synaptomys cooperi*

Overview

There are two main wetland savanna habitats in the New Jersey Pine Barrens. Pine Barren riverside savannas are sedge and grass dominated wetlands found along stream edges and in floodplains on the coastal plain of New Jersey. They are permanently saturated by groundwater seepage but can be seasonally inundated by stream flooding after storm events (Walz et al. 2006). Often bordered by Atlantic white cedar (*Chamaecyparis thyoides*) or pitch pine lowland swamps, these savannas support many carnivorous plants as well as numerous globally rare plants species such as Knieskerns beaked-rush (*Rhyncospera knieskernii*) and bog asphodel (*Narthecium americanum*). In fact, *Rhynchospora kneiskernii* is listed as Threatened by the U.S. Fish and Wildlife Service, and *Narthecium americanum* is a Candidate species under consideration for listing (Walz et al. 2006a). Pitch pine reedgrass savannas are also found on moist soil but are predominantly maintained by fire. Depending on moisture levels, they share many rare plants species in common with the riverside savanna habitats. The majority of the pine barren riverside savanna habitats are found in natural areas within the Wharton State Forest (Walz et al. 2006a). Pitch pine reedgrass savannas are found within state protected lands including Bass River State Forest, Penn State Forest, Stafford Forge Wildlife Management Area, and federal military Joint Base McGuire-Dix-Lakehurst. There are six different Pine Barren riverside savanna ecological community types and one pitch pine reedgrass savanna type found in New Jersey, but for the purposes of this report we are addressing savanna as habitat systems, not focusing just on one particular savanna type.

Savannas are included in the NE Wildlife Habitat Classification System as Northern Atlantic Coastal Plain Stream and River (Pine Barren riverside savannas) and Northern Atlantic Coastal Plain Pitch Pine Lowland (pitch pine reedgrass savanna); in the New Jersey Landscape Map as Emergent, Forest and Wetland Species-Based Habitat; and mapped in the New Jersey Land Use/Land Cover as Herbaceous Wetlands, Coniferous Scrub/Shrub Weltands, Mixed Scrub/Shrub Wetlands (Coniferous Dominant), and Coniferous Wooded Wetlands. See Appendix B for more details on habitat classification.

Fourteen (14) state endangered plant species occur in pine barren savanas, including Pickering's Reed Grass (*Calamagrostis pickeringii*), Spreading Pogonia (*Cleistes divaricata*), Rough Cotton-grass (*Eriophorum tenellum*), Pine Barren Boneset (*Eupatorium resinosum*), New Jersey Rush (*Juncus caesariensis*), Bog Asphodel (*Narthecium americanum*), Yellow Fringeless Orchid (*Platanthera integra*), Knieskern's Beaked-rush (*Rhynchospora knieskernii*), Long's Woolgrass (*Scirpus longii*), Lace-lip Ladies'-tresses (*Spiranthes laciniata*), False Asphodel (*Tofieldia racemosa),* Reversed Bladderwort (*Utricularia resupinata),* Fringed Yellow-eyed-grass (*Xyris fimbriata*), Death-camus (*Zigadenus leimanthoides*). See Appendix A for complete species list with rarity rankings.

Animals identified as Species of Greatest Conservation Need (SGCN) in the 2008 State Wildlife Action Plan (SWAP) that rely on Pine Barren savannas include southern bog lemming (*Synaptomys cooperi*), four Lepidoptera species including *Dichagyris reliqua*, Arogos skipper (*Atrytone arogos*), Carter's noctuid moth [*Photedes* (*Spartiniphaga) carterae*], and Georgia satyr (*Neonympha areolata*) and one bird species, the northern parula warbler [*Setophaga (Parula) americana*]. See Table A fora list of wildlife SGCN with rarity ranks. [note: The New Jersey and coastal plain populations of Georgia satyr are now considered a separate species, Helicta satyr (*Neonympha helicta*) (D. Schweitzer, personal communication, 2013; see NatureServe 2013).

Threats

Savannas have been present in the Pine Barrens landscape for at least 8000 years (Walz et al. 2006b). In New Jersey, savannas are maintained as open habitat by groundwater seepage and persistent soil saturation, or by fire (pitch pine reedgrass savanna), although past land use may have been a factor in some cases. Past human disturbances have included peat removal, bog iron mining, cedar logging, and cranberry farming (Walz et al. 2006b).

Any significant alteration of these processes will change the plant community composition and vegetation structure, and affect dependent wildlife. For this reason, changes in hydrology, whether a lowering of the water table due to groundwater withdrawal or, conversely, long term flooding by beaver activity, as well as changes to the fire regime can threaten these habitats. In addition, groundwater contamination from agricultural and residential land use or expansion of cranberry bogs into existing savannas on unprotected lands may also be a threat.

While fire is an important element in maintaining pitch pine reedgrass savannas, more frequent, hotter fires that burn through the duff could harm wildlife, especially Lepidoptera. Recreational overuse by ORVs harms vegetation and compacts soils and even exploring canoeists and botanical field trip participants can trample sensitive vegetation. In addition, collecting of orchids and other rare plants also threatens Pine Barrens savanna habitats (Walz et al. 2006a).

A summary of CMP Threats to state endangered plants and wildlife SGCN in pine barren savanna habitat is found in Appendix C.

Species Ecology

Plants:

The rare plants of the riverside savannas are well-adapted to the wet, acidic, nutrient-poor soils of these open savannas, with their particular hydrology. The seeds of some plants such as cotton-grass (*Eriophorum tenellum*) disperse via water, although the plant can also reproduce via spreading rhizomes (Hays 2001).

All of the plant species considered rare are perennials. One, Kneiskern's beaked-rush, is a Pine Barren endemic, found in New Jersey and nowhere else. Seven of the listed plant species are at the northern edge of their range, including the false asphodel (*Tofieldia racemosa*), bog asphodel (*Narthecium americanum*), spreading pogonia (*Cleistes divaricata),* fringed yellow-eyed grass *(Xyris fimbriata),* lace-lip ladies'-tresses *(Spiranthes laciniata*), pine barren boneset (*Eupatorium resinosum*), and the yellow fringeless orchid (*Platanthera integra*). In contrast, other species like rough cotton-grass (*Eriophorum tenellum*), Long's woolgrass (*Scirpus longii*), Pickering's reed grass (*Calamagrostis pickeringii*), and larger St. John's wort (*Hypericum majus*), are at the southern edge of their range.

While predominantly a wetland community, fire may occasionally (drought conditions) pass through riverside savannas. In contrast, pitch pine reedgrass savannas are fire-maintained, where periodic fires are needed to keep the habitat open and promote the persistence of reedgrass and other fire-dependent species. Some plants like Long's woolgrass are considered "pyrophytes", they gain competitive advantage from fire (Rawinski 2001). These species require some periodic disturbance, such as fire, flooding, or herbivory to stimulate flowering.

The following two tables provide a list of state endangered species that can found in Pine Barren Savannas in New Jersey with their phenology, or timing of vegetative, flowering and fruiting, and comments on their habitat/niche. The phenology and habitat information can be used to help avoid negative impacts to these state endangered plant species during wildlife surveys and management activities.

Phenology of State Endangered Plants in Pine Barrens Savanna Habitat

FL = Flowering; FR = Fruiting; V = Vegetative

		APRIL		MAY		JUNE		JULY		AUG		SEPT		OCT		NOV	
SCIENTIFIC NAME	**COMMON NAME**	**1-15**	**16-30**	**1-15**	**16-31**	**1-15**	**16-30**	**1-15**	**16-31**	**1-15**	**16-31**	**1-15**	**16-30**	**1-15**	**16-31**	**1-15**	**16-30**
Calamagrostis pickeringii	Pickering's Reed Grass					FL	FL, FR	FR	FR	FR	FR	FR	FR	FR			
Cleistes divaricata	Spreading Pogonia						FL	FL	FR	FR	FR	FR					
Eriophorum tenellum	Rough Cotton-grass				FL, FR	FL, FR	FL, FR	FR	FR								
Eupatorium resinosum	Pine Barren Boneset								FL	FL	FL, FR	FL, FR	FL, FR	FL, FR	FL, FR	FR	
Juncus caesariensis	New Jersey Rush					FL	FL	FR	FR	FR	FR	FR	FR	FR	FR		
Narthecium americanum	Bog Asphodel						FL	FL, FR	FL, FR	FL, FR	FR	FR	FR	FR	FR	FR	FR
Platanthera integra	Yellow Fringeless Orchid								FL	FL	FL	FL, FR	FL, FR	FR	FR		
Rhynchospora knieskernii	Knieskern's Beaked-rush							FL	FL, FR	FR	FR	FR	FR	FR	FR	FR	
Scirpus longii	Long's Woolgrass				FL	FL	FL, FR	FL, FR	FL, FR	FL, FR	FL, FR	FR	FR				
Spiranthes laciniata	Lace-lip Ladies'-tresses									FL	FL	FL, FR	FL, FR	V			
Tofieldia racemosa	False Asphodel						FL	FL	FL, FR	FR	FR	FR	FR	FR	FR		
Xyris fimbriata	Fringed Yellow-eyed-grass								FL	FL, FR	FL, FR	FL, FR	FR	FR			
Zigadenus leimanthoides	Death-camus							FL	FL	FL, FR	FR	FR	FR	FR	FR		

PINE BARRENS SAVANNAS – State Endangered Plant Habitat/Niche Comments

SCIENTIFIC NAME	COMMON NAME	Habitat/Niche Comments
Calamagrostis pickeringii	Pickering's Reed Grass	Most occurrences are in open, pine barren savannas, also in open, herbaceous swale under a powerline through pine-oak woodland. One of the few grasses that can be found in open Sphagnum mats.
Cleistes divaricata	Spreading Pogonia	Pine barren savannas and margin of Coastal Plain intermittent pond.
Eriophorum tenellum	Rough Cotton-grass	Frows in sedge and grass dominated pine barren savanna. Historically also collected from Atlantic white cedar swamps and various other sphagnous wetlands.
Eupatorium resinosum	Pine Barren Boneset	Saturated to seasonally-saturated sand, such as in pinelands shrub bogs, streambanks and disturbed wet openings. Full or mostly full sun; post-fire sprouting suspected; seedlings thought to require full sun and mineral soil for germination/growth; disturbance creates and maintains habitat.
Juncus caesariensis	New Jersey Rush	Typically found in open sphagnous bogs and seepage areas adjacent to Atlantic white cedar swamps and stream corridors. Also occurs in disturbed areas like roadside ditches and railroad and powerline rights-of way.
Narthecium americanum	Bog Asphodel	A wetland species restricted to sphagnous or peaty sedge and grass dominated savannas and seepage areas adjacent to Atlantic white cedar swamps in the Pine Barrens.
Platanthera integra	Yellow Fringeless Orchid	Grows in open or thicket seepage areas of sedge and grass dominated savannas along pine barren rivers. Historically collected from pitch pine lowland forests.
Rhynchospora knieskernii	Knieskern's Beaked-rush	Grows in saturated to seasonally-saturated fine sand and clay, in open moist areas of pinelands with exposed mineral soil; such as early successional habitats in pitch pine lowlands, riverside savannas, bog iron deposits or flood scoured areas along streams; also in disturbed roadsides, scrapes, gravel pits in wetlands.
Scirpus longii	Long's Woolgrass	Grows in moist to saturated sandy or peaty soils in swales, pond margins, and stream sides. Mostly in pitch pine lowland forest, especially areas with frequent fire history. This species has been observed most often in open shallow-water habitats, described as wet soggy meadows or swales, sedge meadows, sandy-peat bogs, though Sphagnum is usually absent, or depressions, associated with river-stream floodplains, or resulting from human excavations. The shallow water of these habitats is often seasonally fluctuating, subject to summer drought.

Spiranthes laciniata	Lace-lip Ladies'-tresses	Grows in wet, peaty or sphagnous seepage areas of open pine barren savannas and intermittent Coastal Plain ponds.
Tofieldia racemosa	False Asphodel	Grows in open, sphagnous seepage areas of pine barren river savannas.
Xyris fimbriata	Fringed Yellow-eyed-grass	Grows in sphagnous seepage areas of pine barren savannas.
Zigadenus leimanthoides	Death-camus	Grows in peaty thickets, swales, riverside savannas, streamsides, and occasionally open wet woods.

Animals:

The **southern bog lemming** is highly localized, preferring moist grassy areas with hummocks and sphagnum mats, and abundant vegetative cover (although they can use upland habitats (Whittaker and Hamilton 1998). They feed on leaves, stems, and seeds of wetland vegetation with small piles of grass cuttings found in burrows or along runways (Whittaker and Hamilton 1998). Lemmings appear to be most active in May, primarily nocturnal, and move to the wetter areas of the riverside savanna as the summer progresses and other sections dry out. They travel throughout these wetter areas via underground tunnels and surface runways (Buchanan 2006). Sociable animals, they usually occur in small colonies (Whittaker and Hamilton 1998).

The **northern parula warbler** nests in conifers such as Atlantic white cedar. When it is available, they will use old man's beard lichen (*Usnea barbata*) for nest construction (Leck 1979), however they also use other vegetation. Parula warblers forage for insects in the open areas of the savannas but are not restricted to this habitat. They are considered a rare breeder in the Pine Barrens region.

There are four **Lepidopera** species found in Pine Barrens savannas and three of them (*Dichargyris reliqua*, Arogos skipper, and Carter's noctuid moth depend on the presence of Pine Barrens reedgrass (*Calamovilfa brevipilis*). Reedgrass typically is found in patches around the edges of many of the wetter riverside savannas (Walz et al. 2006a). However, it is dominant in a similar community, the pitch pine reedgrass savanna that occurs in broader seepage areas in upper watersheds particularly in the pine plains. These pitch pine reedgrass habitats support the largest populations of these Lepidopteran species.

Arogos skipper prefers a moist savanna habitat in this part of its range, which extends from northern New Jersey south to Georgia. In Pine Barren populations, Arogos larvae feed on the leaves of pitch pine reedgrass. In contrast to the *Dichargyris*, which requires high intensity fire to stimulate production of its food supply, a similar fire regime could destroy populations of this skipper. The larvae overwinter on the food plant wrapped in a leaf and then resume feeding and development the following spring (Schweitzer et al. 2011).
The main threats to Arogos skippers in the Pine Barrens are loss and fragmentation of habitat due to altered hydrology and/or fire regimes, depending on the habitat in which the butterfly is located (e.g., riverside savannas or pitch pine reedgrass savannas). The skipper

often occurs in metapopulations and must be able to readily move among suitable habitat patches (Schweitzer et al. 2011).

Carter's noctuid moth (aka reed grass borer moth) also relies on the persistence of *Calamovilfa brevipilis*. The moth lays its eggs on the leaves and upon hatching, the larvae crawl inside the plant stem to feed, and burrow into rhizomes over the winter. For this reason, they are more tolerant of surface fires. Carter's noctuid moth is generally found in moist pine savannas that burn only rarely (Schweitzer et al. 2011).

Although ***Dichagyris reliqua*** has not been seen in New Jersey since 1995 further survey is warranted (D. Schweitzer, personal communication, 2012). The larvae of this moth feed on the seeds of *Calamovilfa brevipilis* and were typically found in recently burned pitch pine reedgrass savannas. If present, adults fly in late July/early August and the larvae overwinter in the soil. Management for this species would entail frequent, intense growing season burns that promote flowering and seed set (Schweitzer et al. 2011). This moth could be expected in riverside savannas if the foodplant were in flower. Otherwise, it would be underground in diapause.

The fourth Lepidoptera, **Georgia satyr** (*Neonympha areolata*) (now helicta satyr, (*Neonympha helicta*) is also found in open bogs and wet pine savannas in New Jersey as well as in grassy openings in upland pinelands (Cech and Tudor 2005). The Pine Barrens populations are at the northern edge of the species' range and disjunct from the southern core coastal population (NatureServe 2013c). Larvae feed on sedges, and overwinter when partially grown.

Integrated Conservation Management Guidelines

The following integrated conservation management guidelines address broad categories linked to conservation actions identified in the SWAP and correlated with the TRACS ACTIONS Level 1. We have specifically targeted discussion around the actions where there may be potential for management incompatibility between rare plants and SGCN animals. An important first step in the planning process would be to conduct a thorough survey and mapping of all rare plant and animals species found at a site, including population location, status and condition, such that any proposed management can avoid or minimize impacts.

TRACS ACTIONS

1. Coordination and Administration
2. **Create, Restore, or Enhance Habitat and Natural Processes**
3. **Data Collection and Analysis**
4. Education
5. Facilities and Areas/New Construction
6. Facilities and Areas/Major Renovation
7. Facilities and Areas/Operations and Maintenance
8. Land and Water Rights/Acquisition and Protection
9. Law Enforcement
10. Outreach

11. Planning
12. Species Reintroduction and Stocking
13. Technical Assistance

TRACS ACTION #2:
CREATE, RESTORE, OR ENHANCE HABITAT AND NATURAL PROCESSES

Hydrology and Water Quality Management

Protecting critical riverine and riparian habitat in the Pine Barrens along with establishing and maintaining wetland connectivity are key conservation measures identified in the four Pine Barrens zones of the 2008 SWAP. Actions associated with these goals include land protection, work with public and private landowners, and development of sufficient habitat buffers and landscape connectivity. Each of these actions, if implemented, would benefit rare plants and animals found in these Pine Barren savannas, especially riverside savannas. If the hydrology is maintained in these systems, these habitats should remain open and suitable for rare plants and SGCN.

Vegetation Management

Managing succession: In addition to maintaining critical ecological processes, woody vegetation management is a major component of the SWAP, especially for maintaining early successional wetlands like savannas and shrub-scrub habitats. Techniques may include manual removal (e.g., selective cutting and tree removal, mowing or brushhogging), targeted use of herbicides, and/or application of prescribed fire (see fire management section below). Currently no vegetation management has been proposed for SGCN animals in Pine Barren riverside savannas or reedgrass savannas in the core Pine Barrens. However, any future plans for woody vegetation control or management should keep in mind the life history and habitat needs of rare plants and other SGCN animals that occur at individual sites to avoid non-target impacts.

> Manual vegetation removal: Hand-pruning or selective cutting of woody vegetation can be used to set back succession and open the canopy for those plant and animal species that require it. If done in the winter months, there will be little impact to savanna vegetation or other animal species that use the habitat.
>
> Use of herbicides: Extreme care must be taken if herbicides are used in savannas as most are broad spectrum. Only direct hand application (e.g. hand painting stump cuts) should be considered for shrub control adjacent to rare plant populations.

Silvicultural practices on adjacent uplands: The SWAP recommends working with landowners to promote the use of ecologically appropriate forestry practices as a conservation action. Maintaining upland buffers around savannas and implementing such practices in these upland buffers would benefit both rare plants and SGCN animals in savannas in part by reducing erosion and protecting water quality.

Utility rights-of-way management: The SWAP recommends the development of BMPs for Rights-of-Way (ROW) management for scrub-shrub and animal species that may use them. As ROWs may cut through Pine Barren savannas, the development of management guidelines should be coordinated such that all rare plants as well as wildlife SGCN using ROWs are incorporated into BMPs. This will assist the landowner in making appropriate management decisions and to avoid potentially conflicting recommendations.
Fire Management: Most New Jersey Pine Barrens habitats have been shaped by and are maintained by fire. For this reason, fire management is an ongoing activity, whether by application of prescribed fire for fuel reduction during the winter months or by suppression of hotter growing season burns or wildfires that might affect surrounding development. The way in which fire is managed has a major effect on the persistence and quality of Pine Barrens habitats, including these savannas and their associated rare plants and SGCN wildlife, especially during times of extreme drought.

When considering the use of fire as a management tool, it is necessary to thoroughly assess what rare plant and SGCN animals are present in the habitat, their tolerances to fire, and their distribution on the landscape before developing a plan for when and if to burn, what to burn and how intensely, or whether fire prevention is warranted. In short, the needs of all species, plant and animal, at a site must be considered. This assessment and evaluation does occur on state lands during the NJDEP internal Land Management Review process. But any burn activities considered for private lands do not require this level of assessment as part of the permit application. For this reason, pitch pine reedgrass savannas on private land may be burned by private landowners (e.g., cranberry bog owners that regularly use prescribed fire to clear land and reduce fuel loads; military activity on Ft. Dix that may cause fires) that may affect rare plants and/or SGCN animals.

Without fire, other vegetation management techniques such as mowing are sometimes applied. The ecological and species-specific effects of such management practices must be assessed for each rare species as to whether the results are beneficial, harmful, or benign. Conducting research on fire and its effects on habitats and SGCN animals is another priority goal of the SWAP. A better understanding of landscape effects of fire will be of benefit to long-term viability of plant and animal populations in the Pine Barrens.

Invasive, Over-abundant, and Pest Species Management

Invasive plant species: Management and control of invasive plant species is a conservation goal for all Pine Barrens SWAP zones. To date, there are no known invasive or nonnative plants present in core riverside or pitch pine reedgrass savannas. Should new populations become established, control should begin with the least harmful process (hand pulling or seedhead removal) before moving toward use of chemicals or other less targeted techniques. Biocontrol may be an option for some invasive species, however consultation with experts, both botanists and zoologists is always warranted when considering the use of chemicals and/or biocontrol. Decisions should be made on a site-by-site basis to prevent or minimize negative impacts to non-target rare plant or animal species, or to the habitat.

Insect pests and/or disease pathogens: A number of insect pests may be targeted for control in and around Pine Barren savannas (e.g., mosquitoes, southern pine beetle). Control measures often include application of pesticides, many of which are broad spectrum or are applied at times of the year when other invertebrates may be vulnerable or are applied in a manner harmful to the rare plant community (e.g., trampling). In the case of the southern pine beetle (*Dendroctonus frontalis*), removal of infested trees and a 50 – 100 foot buffer of uninfested trees to prevent the spread of the outbreak has been recommended. Tree cutting during the breeding season may affect northern parula warblers, skidding of trees during removal may harm rare plants and habitat.
Any proposed control measures should be site specific and the use of integrated pest management and committed ongoing coordination among agencies and with savanna managers to reduce non-target impacts is critical. In all cases, botanists and zoologists should be included in the discussion to avoid any potential harm to rare plants or SGCN populations or the habitat.

Deer control: Management of deer populations is an important conservation action identified in the SWAP to promote forest health and biodiversity. Deer consume rare plants and larval food plants and nectar sources for Lepidoptera, among other impacts (Côté et al. 2004, Rawinski 2008, Schweitzer et al. 2011). Management measures may include increased hunting efforts or fencing of vulnerable habitat against deer. Managing the size of local deer herds would benefit both rare plants and SGCN animals, and any trampling of vegetation by hunters would occur when most plants are dormant. To date, deer herbivory has not been identified as a major threat in these savannas but their presence and browsing activity should be regularly monitored.

Beaver control may be needed on occasion in Pine Barrens savannas and has also been identified as a conservation action in the SWAP. Typically this could include trapping and removing beaver from a site to prevent dam construction (or partial dam removal), and/or the installation of a water level control device. Since the rare plants and the SGCN all rely on a similar site hydrology, beaver control should benefit both in riverside savanna habitats.

Note: Proper protocols should be put in place to minimize spread of invasive species propagules and/or disease (e.g. Chytrid fungus, Ranavirus) among wetland sites. It is best to follow these or similar recommendations between site visits: 1) wash boots and field equipment with soap and water; 2) rinse in clean water; and 3) disinfect with a 10% bleach solution and allow to air dry (Dodd 2010; B. Zarate, personal communication, 2013). Pinelands Commission scientists have also adopted a disinfection procedure to use between sites, similar to the above (J. Bunnell, personal communication, 2013).

Recreational Use Management

Use of ORVs and 4WD vehicles is a popular pastime in the Pine Barrens, whether by individuals or as part of large-scale organized enduro events. Regulating this use is a priority of the SWAP and conservation actions identified in the SWAP that protect this

habitat from encroachment by vehicles, coupled with adequate enforcement, would be of benefit to rare plants and SGCN animals.

Passive recreation can sometimes also threaten the integrity of the savanna vegetation, for example, when canoeists stop to explore stream banks and adjacent wetlands, trampling sensitive vegetation or disturbing wildlife. Public education is an important tool for ongoing conservation of these rare habitats and their associated species and the SWAP includes conservation actions encouraging public outreach and education.

In addition, the SWAP recommends enhancing public access opportunities, also an important goal. However, if wildlife viewing structures or trails are planned in or near riverside or reedgrass savannas, care must be taken to avoid altering site hydrology, permitting unguided access into vulnerable habitat to avoid trampling and introducing invasive plant seeds, and harming sensitive plants and animals during construction.

SPECIES MANAGEMENT (=TRACS ACTION TARGETS)

Species-Specific Management Actions identified in the SWAP:

Arogos skipper: The SWAP recommends surveying suitable habitats in the Mullica River zone to identify new populations of this skipper. Such survey will have no impact on pine barren riverside savannas or pitch pine reedgrass savannas if sensitive vegetation is not trampled (see guidelines for survey and monitoring). The SWAP also calls for development of a management plan to maintain and enhance habitat for Arogos skipper using controlled burns. Development of this plan must be done in consultation with other experts to avoid impacts to non-target species in the same habitat.

TRACS ACTION #3:
DATA COLLECTION AND ANALYSIS (TRACS Level 1)
Research, Survey, or Monitoring (TRACS Level 2)

Inventory and Long-term Monitoring

Conducting baseline survey and long-term monitoring for all SGCN animals is a conservation priority in all Pinelands landscape zones. In particular, forest passerines (e.g., northern parula) have been mentioned as targets for this work. Plant and animal population monitoring efforts at a site should be coordinated to prevent situations where multiple monitoring initiatives are occurring, potentially creating frequent, extensive, long-term disturbance without sufficient recovery periods. As mentioned previously, it is also recommended that there be a thorough survey and mapping of all rare species found at a site, including population location, status and condition, such that any proposed management can avoid or minimize impacts.

Animal survey and monitoring techniques –minimizing harm to plants:
Breeding bird surveys: Assessing the status of the northern parula warbler or other passerines in these habitats would generally require multiple site visits in May and June

during the breeding season. Surveys for the parula warbler should have minimal impact on rare plants in the savanna as these bird surveys are typically conducted as roadside point counts (S. Petzinger, personal communication, 2013).

Lepidoptera surveys: Moth surveys generally consist of evening visits with light traps throughout the flight season for each species but with minimal vegetation trampling as lights are typically placed at the edge of the wetland (D. Schweitzer, personal communication, 2012). The helicta satyr flies from late June through July in these Pine Barrens locations and would best be surveyed during the day during this flight period. Consult the plant phenology tables in this report and any rare species maps that are prepared for additional guidance when planning the location and timing of helicta satyr survey work.

The SWAP recommends working with qualified groups or citizen scientists to conduct surveys at particular sites, depending on the level of expertise needed. It is important that survey methodology be developed upfront, to be sure that there is no conflict in recommended techniques and that volunteers are made aware of the need to avoid rare plant populations at specific sites.

Mammal surveys: Survey and monitoring of the southern bog lemming may entail extensive walking through the site. If live traps are used, they are typically placed along runways within the habitat, as the animals are faithful to them. Pitfall traps may also be used, however avoid digging up any rare plants when installing traps (M. Valent, personal communication, 2013). As bog lemmings are often difficult to trap, an analysis of owl pellets can be useful in certain locales (Whittaker and Hamilton 1998). In all cases, consult the plant phenology tables in this report and any rare species maps that are prepared for additional guidance when planning the location and timing of survey work.

Rare plant survey and monitoring techniques –minimizing harm to animals:

Plant surveys: Plant surveys and rare plant monitoring activities can occur throughout the growing season as phenology differs among species, and over multiple years since growing conditions vary from year to year. Such activities may include random searches through habitat, use of parallel transects, and/or the establishment of long-term vegetation monitoring plots.

Rare plant populations in savannas are regularly monitored. However, there should be no impact to northern parula warblers or bog lemmings for any transect or other ground plant survey work (S. Petzinger, personal communication, 2013; M. Valent, personal communication, 2013).

Climate Change Vulnerability Assessment

The year 2012 was the warmest on record nation-wide (NOAA 2013) and in the garden state (Robinson 2013), with more changes forecast to come. In New Jersey the effects of climate change are projected to include: an increase in average temperature (minimum 2-6

°F. increase by 2050) and precipitation (although the exact nature of the change in precipitation may vary across the state); more extreme weather events such as storms and droughts; and sea level rise. Generally we can expect more prolonged summer heat waves with temperatures above 90° F., and fewer cold days and nights during the winter, which may be of import for those species requiring cold dormancy. Rainfall, especially in the northern part of the state may increase in amount mainly in the winter months (Faass et al. 2012, NJ Climate Adaptation Alliance 2013a).

Savanna Habitats and Climate Change:

According to Faass et al. (2012) there are a number of stressors that should be looked at to determine whether or not a particular plant community is vulnerable to climate change. These stressors include: 1) exacerbation of other non-climate stressors; 2) specific hydrologic conditions; 3) vulnerability to human response; 4) sensitivity to extreme climate events; 5) intrinsic adaptive capacity; 6) species vulnerability; 7) latitudinal constraints; 8) management feasibility; 9) degree of cold adaptation; and 10) location in geographical range. (For a detailed discussion of each of these stressors, see Faass et al. 2012.)

Pine Barrens savannas are susceptible to a number of these stressors. Riverside savannas are maintained by specific hydrologic conditions that require constant groundwater seepage. The significant alteration to precipitation patterns anticipated with a changing climate (e.g., greater flood events, increased drought the summer months) may alter groundwater flow and seepage. This may be compounded by increased development at the periphery of the Pine Barrens in future years, putting more pressure on underlying aquifers. This in turn will affect plant and animal species composition, favoring species adapted to drier conditions and possibly permitting greater invasive species incursion (non-climate stressor).

Reedgrass savannas are maintained fire. Although some studies in the western U.S. have shown a predicted increase in wildlife fire frequency with changing climate, recent research in New Jersey indicates that fire size and intensity here may not change appreciably in the coming years (Clark et al. in press). In New Jersey, wildfire is currently constrained by habitat fragmentation and ongoing fuel management activities. However, it is difficult to predict future scenarios as there are many additional confounding factors to consider with changing climate, such as the introduction of new forest pests and changes in tree and plant species composition and subsequent effects on fuels. Also, the increase in other disturbances to the landscape such as more storm and wind events may play a role.

Species and Climate Change:

Plants: Using the NatureServe Climate Change Vulnerability Assessment (CCVA) model (NatureServe 2011), state endangered plant species of Pine Barren savannas were assessed for climate vulnerability (see Ring and Spencer 2013). Six species (43%) including Rough Cotton-grass (*Eriophorum tenellum*), Pine Barren Boneset (*Eupatorium resinosum*), New

Jersey Rush (*Juncus caesariensis*), Bog Asphodel (*Narthecium americanum*), Knieskern's Beak-rush (*Rhynchospora knieskernii*), Death Camas (*Zigadenus leimanthoides*), were considered moderately vulnerable to a changing climate. Of these, one (*Eriophorum tenellum*, rough cotton-grass) is at the southern edge of its range while the others are considered vulnerable for specific life history traits. Eight (57%) of the rare plants species were presumed stable, likely because in general core pine barren habitats are largely intact and relatively protected from human disturbance. For more detailed discussion, see Ring and Spencer (2013).

Animals:

Southern Bog Lemming – A CCVA for southern bog lemmings has not been completed in New Jersey as not enough is known about their status and life history in the state to populate the model. However, a CCVA was prepared for Illinois populations that found the lemming to be "presumed stable" in light of climate change based on similar life history factors (Hollingshead 2011). Unless Pine Barrens riverside savanna habitats change significantly with a changing climate, it is likely that lemming populations will remain relatively stable. No additional habitat management actions are proposed to address climate change needs for this species.

The rare **moths and butterfly** depend on the presence of their food plants for survival. Three of the four species rely on Pine Barrens reed grass. Although a CCVA was not conducted for it, reed grass is widespread in the Pine Barrens and the habitat in the core Pine Barrens remains relatively intact, so it may persist. Georgia satyr (= helicta satyr) is a southern species, although New Jersey populations are disjunct from the core southern populations. Depending on how its habitat migrates, this satyr may actually do well with a warming climate. A warmer New Jersey climate may enable them to become bivoltine, completing two life cycles in a summer instead of the single generation it currently completes (D. Schweitzer, personal communication, 2012). Arogos skipper may also benefit for similar reasons. A warming climate could extend the growing season in turn enabling the skipper, which is currently at the extreme northern edge of its range in New Jersey, to produce more generations per season. It is unclear how climate change will affect the other moth species. In any case, no new habitat management practices have been proposed for these Lepidoptera species to account for climate changes impacts.

Northern parula warblers are at the northern edge of their breeding range. Their numbers declined during the early- to mid-1900s in New Jersey, possibly due to the decline of *Usnea* lichen with which they built their nests. However, their numbers have increased in recent years in the state, perhaps due to their ability to use alternate nest materials (Walsh et al. 1999) and habitats (riverside floodplain forest over swamps in other regions) (W. & S. Wander, personal communication, 2012). It is unclear how a changing climate will affect them although the U.S. Forest Service climate bird atlas projections indicate that their numbers will likely increase in New Jersey in future years (Matthews et al. 2007).

Climate Change Summary

There are no specific management recommendations proposed to address climate change for Pine Barrens savannas or any of the savanna species highlighted in this report other than maintaining appropriate ecological processes: site hydrology and wetland connectivity on the landscape for riverside savannas and fire frequency and type of burn (growing season) for reedgrass savannas. For these reasons, no additional habitat management conflicts are anticipated in the near term due to plant and animal species management activities. As riverside savannas have persisted on the landscape for thousands of years and are intimately associated with riverine habitats, they may remain relatively stable in light of future climate change. Although current projections are for wildfire frequency and severity to remain relatively constant (Clark et al. in press), the need for ongoing fire management for fire-dependent habitats remains.

Therefore, the Pine Barren species management actions currently outlined in the SWAP should continue (modified as needed by the recommendations in this report). Addressing existing hydrology and water quality issues, invasive species, recreational overuse, and other threats as necessary to maintain or restore existing habitat will be key to resiliency. The ability of Pine Barrens savannas to withstand change over time while retaining their basic structure and function will enable them to support viable populations of rare plants and wildlife SGCN into the future (Anderson and Ferree 2010).

Overall Conclusions:

Pine Barrens savannas support significant populations of rare plants and SGCN animals. Based on the information presented in the 2008 SWAP, there are few management actions proposed for the SGCN in these habitats that would potentially affect the rare plants also occurring in these habitats. In part, this is a result of the fact that the savannas occur within the Pine Barrens in a relatively well protected and intact matrix landscape. Intensive survey and monitoring of multiple species at individual sites would cause harm, and therefore regular communication among organizations and others working in these habitats is critical to minimize impact.

Integrated Management Guidelines: Coastal Plain Intermittent Pond Habitat

Hirst brothers' panic grass (*Dichanthelium hirstii*); Coastal plain intermittent pond; Pine Barren treefrog (*Hyla andersonii*)

Overview

New Jersey's Coastal Plain Intermittent Ponds (CPIP) are found on the state's Inner and Outer Coastal Plain, and were formed in Wisconsin periglacial depressions. Plant and animal inhabitants of these ponds rely on their seasonal hydrology, typically filling and drying annually. Foremost among these is Hirst brothers' panic grass (*Dichanthelium hirstii* or *Panicum hirstii*), one of the rarest grass species in the world and listed as a federal candidate species (Walz et al. 2006b). The ponds themselves are also considered rare throughout their range. There are 11 different coastal plain intermittent pond ecological community types found in New Jersey, but for the purposes of this report we are addressing these ponds as habitat systems, not focusing just on one particular type.

Coastal plain intermittent ponds are included in the NE Wildlife Habitat Classification System as Northern Atlantic Coastal Plain Pond; in the New Jersey Landscape Map Emergent and Wetland Species-Based Habitat and Vernal Habitat; and mapped in the New Jersey Land Use/Land Cover as Herbaceous Wetlands See Appendix B for more details on habitat classification.

Seventeen (17) state endangered plant species occur in coastal plain intermittent ponds, including Southern Boltonia (*Boltonia asteroides var. glastifolia),* Wrinkled Jointgrass (*Coelorachis rugosa),* Marsh Flat Sedge (*Cyperus pseudovegetus),* Hirst Brothers' Panic Grass (*Dichanthelium hirstii or Panicum hirstii),* Larger Buttonweed (*Diodia virginiana var. virginiana),* Knotted Spike-rush (*Eleocharis equisetoides),* Featherfoil (*Hottonia inflata),* Barton's St. John's-wort (*Hypericum adpressum),* Clasping-leaf St. John's-wort (*Hypericum gymnanthum),* Boykin's Lobelia (*Lobelia boykinii),* Narrow-leaf Primrose-willow(*Ludwigia linearis),* Awned Meadow-beauty (*Rhexia aristosa),* Small-head Beaked-rush (*Rhynchospora microcephala),* Slender Arrowhead (*Sagittaria teres),* Torrey's Bulrush (*Schoenoplectus torreyi),* Dwarf White Bladderwort (*Utricularia olivacea),* Reversed Bladderwort (*Utricularia resupinata*). See Appendix A for complete species list with rarity rankings.

Animal Species of Greatest Conservation Need (SGCN) identified in the 2008 State Wildlife Action Plan (SWAP) include Pine Barrens treefrog (*Hyla andersonii*), carpenter frog

(*Lithobates virgatipes*), and two damselflies and one dragonfly (Pine Barrens bluet [*Enallagma recurvatum*], scarlet bluet [*Enallagma pictum*], and golden-winged skimmer [*Libellula auripennis*]). Other SGCN have been documented from coastal plain intermittent ponds (e.g., Fowler's toad (*Anaxyrus fowleri*), southern gray treefrog (*Hyla chrysoscelis*), etc.) (Walz et al. 2006b) but for the purposes of this report they were not included, rather we chose representative species of core Pinelands ponds. The presence of any of these animals at a particular pond depends upon pond hydrology, particularly the length of time ponds retain standing water during the season.

For the purposes of this assessment we are focusing on the CPIP natural community found in the four New Jersey Pine Barrens SWAP zones (Western, Mullica drainage, northern, and southern), although there are other significant coastal plain intermittent ponds found on the inner and outer coastal plain in Cape May, Cumberland, Gloucester, and Salem counties).

Threats

Threats to Coastal Plain Intermittent Ponds range-wide include altered hydrology that modifies the annual cycle of filling and drying, and runoff with nutrients and other pollutants that alter water quality and change the water chemistry of the acid Pine Barrens waters. Changes in pond chemistry have significant impacts to breeding amphibians and to rare plant species. Groundwater depletion due to agricultural use or due to surrounding development also threatens pond hydrology (Walz et al. 2006b), with implications for those species, such as treefrogs that rely on ponds holding water for certain lengths of time during the season.

Ponds are also threatened by Off Road Vehicle (ORV) use that crushes rare plants, compacts soil, alters site hydrology, and causes direct mortality of animals in their path (Switalski and Jones 2012). Invasive species like nonnative fish or bullfrogs (*Lithobates catesbeiana*) outcompete and/or consume native pond amphibians (J. Bunnell, personal communication, 2013) while over-browsing by white-tailed deer in some ponds alters the habitat structure and destroys rare plants. Suppression of natural fire regimes is also a concern in Pine Barrens landscapes that have evolved in the presence of fire. Although most ponds are maintained primarily by site hydrology, some coastal plain intermittent ponds have been and are affected by periodic wildfires especially during times of extreme drought, which helps shape their vegetation and structure (Little 1979, Laidig 2010). Other threats to coastal plain intermittent ponds in New Jersey have included ditching and draining of these wetlands, sand and gravel mining, and past conversion to cranberry bog operations (Walz et al. 2006b).

A summary of CMP Threats to state endangered plants and wildlife SGCN in coastal plain intermittent pond habitat is found in Appendix C.

Species Ecology

Plants:

Rare plants of coastal plain intermittent ponds are well-adapted to the changing hydrology of these ponds. The seeds of grasses and forbs become part of the seed bank, germinating and flowering as conditions become suitable. In fact, some seeds can remain viable for decades. In contrast, during periods of either extended flood or drought, some perennial plants such as grasses and orchids survive by storing energy underground in their rhizomes or tubers (Walz et al. 2006b).

Of the seventeen rare species found in these ponds, nine are at the northern limit of their range, six are mid-range, and two are at the eastern edge of their range (e.g., southern boltonia and marsh flat sedge). See Ring and Spencer (2013) for more detailed information.

The following two tables provide a list of state endangered species that can found in Coastal Plain Intermittent Ponds in New Jersey with their phenology, or timing of vegetative, flowering and fruiting, and comments on their habitat/niche. The phenology and habitat information can be used to help avoid negative impacts to these state endangered plant species during wildlife surveys and management activities.

FL = Flowering; FR = Fruiting; V = Vegetative

Phenology of State Endangered Plant Species in Coastal Plain Intermittent Pond Habitat		**APRIL**		**MAY**		**JUNE**		**JULY**		**AUG**		**SEPT**		**OCT**		**NOV**	
SCIENTIFIC NAME	**COMMON NAME**	**1-15**	**16-30**	**1-15**	**16-31**	**1-15**	**16-30**	**1-15**	**16-31**	**1-15**	**16-31**	**1-15**	**16-30**	**1-15**	**16-31**	**1-15**	**16-30**
Boltonia asteroides var. glastifolia	Southern Boltonia					V	V	V	V	V	FL	FL	FL				
Coelorachis rugosa	Wrinkled Jointgrass									FL	FL	FL, FR	FL, FR	FR	FR	FR	
Cyperus pseudovegetus	Marsh Flat Sedge							FL	FL	FL, FR	FR	FR	FR	FR			
Panicum hirstii (Dichanthelium hirstii)	Hirst Brothers' Panic Grass					FL	FL, FR	FR	FR	FR	FR	FL, FR	FL, FR	FR	FR	FR	
Diodia virginiana var. virginiana	Larger Buttonweed						FL	FL	FL, FR	FL, FR	FL, FR	FL, FR	FR	FR			
Eleocharis equisetoides	Knotted Spike-rush					FL	FL, FR	FL, FR	FR	FR	FR	FR	FR	FR	FR	FR	
Hottonia inflata	Featherfoil			FL	FL, FR	FL, FR	FL, FR	FL, FR	FR	FR							
Hypericum adpressum	Barton's St. John's-wort								FL, FR	FL, FR	FL, FR	FR	FR				
Hypericum gymnanthum	Clasping-leaf St. John's-wort						FL	FL	FL, FR	FL, FR	FL, FR	FL, FR					
Lobelia boykinii	Boykin's Lobelia						FL	FL, FR	FL, FR	FL, FR	FR	FR					
Ludwigia linearis	Narrow-leaf Primrose-willow							FL	FL, FR	FL, FR	FL, FR	FR	FR	FR			
Rhexia aristosa	Awned Meadow-beauty								FL	FL	FL, FR	FL, FR	FL, FR	FL, FR	FR	FR	
Rhynchospora microcephala	Small-head Beaked-rush								FL	FL, FR	FR	FR	FR				
Sagittaria teres	Slender Arrowhead							FL	FL, FR	FL, FR	FL, FR	FL, FR	FR				
Utricularia olivacea	Dwarf White Bladderwort								FL	FL	FL						

Coastal Plain Intermittent Pond - Rare Plant Habitat/Niche Comments

SCIENTIFIC NAME	COMMON NAME	Habitat/Niche Comments
Boltonia asteroides var. glastifolia	Southern Boltonia	Herbaceous dominated clay bottomed vernal ponds.
Coelorachis rugosa	Wrinkled Jointgrass	Restricted sedge and grass dominated turfy zones in intermittent Coastal Plain ponds.
Cyperus pseudovegetus	Marsh Flat Sedge	Upper shoreline edge of intermittent Coastal Plain pond.
Dichanthelium hirstii (Panicum hirstii)	Hirst Brothers' Panic Grass	Restricted to dry bottoms or in shallow water of intermittent Coastal Plain ponds.
Diodia virginiana var. virginiana	Larger Buttonweed	Grows in shallow water filled depressions in open areas of wet woods, open, wet, grassy swales, and intermittent pond shores.
Eleocharis equisetoides	Knotted Spike-rush	Grows in shallow water of intermittent Coastal Plain ponds.
Hottonia inflata	Featherfoil	Grows in open, usually shallow, water of intermittent ponds, sluggish streams, and wet depressions in wooded swamps.
Hypericum adpressum	Barton's St. John's-wort	Seasonally saturated to flooded acidic sands and peat of shores/margins of freshwater ponds, swales, wet meadows, and depressions.
Hypericum gymnanthum	Clasping-leaf St. John's-wort	Edge of wet woods, boggy meadows, peaty pond shores, and borrow pits, growing in wet, sandy soil of shallow depressions.
Lobelia boykinii	Boykin's Lobelia	Restricted to Coastal Plain Intermittent Ponds.
Ludwigia linearis	Narrow-leaf Primrose-willow	Typically occurring in intermittantly wet habitats such as pond shores, ditches and inactive sand and gravel pits.
Rhexia aristosa	Awned Meadow-beauty	Grows in sandy bottomed Coastal Plain intermittent ponds and shallow warter of abandoned sand and gravel pits.
Rhynchospora microcephala	Small-head Beaked-rush	Grows in moist to wet sand in powerline ROW's through pitch pine lowland forests and sphagnous hummocks in overgrown boggy borrow pits.
Sagittaria teres	Slender Arrowhead	Restricted to shallow water or exposed sandy or muddy bottoms of Coastal Plain intermittent ponds.
Utricularia olivacea	Dwarf White Bladderwort	Grows in shallow, acid water of a large Coastal Plain intermittent pond in the Pine Barrens.

Animals:

Pine Barrens treefrogs are found from New Jersey south along the coastal plain in three disjunct populations; the New Jersey Pine Barrens, the Carolina Sandhills, and the Florida panhandle. (They have recently been confirmed from southern Alabama near the Florida panhandle [J. Bunnell, personal communication, February 2013.] In New Jersey, treefrogs begin calling in mid-to-late April with peak calling in May and part of June, when ponds still hold sufficient water. Coastal plain intermittent ponds provide important breeding habitat, although treefrogs will use a range of wetlands including other natural and excavated ponds and the edges of some high-quality on-stream impoundments (Zampella and Bunnell 2000). Up to one thousand eggs are scattered on the pond bottom or attached to vegetation. Larvae transform in 80 – 100 days, beginning in late June and disperse into adjacent upland habitat (Bunnell and Ciraolo 2010).

Carpenter frogs are found on the coastal plain from New Jersey south to the Florida/Georgia border in Okefenokee Swamp. Their distribution in New Jersey is somewhat restricted in that they are only found in more forested landscapes in the Pine Barrens. Carpenter frogs use a variety of aquatic habitats including coastal plain intermittent ponds, other natural as well as excavated ponds, and other acidic wetlands (Zampella and Bunnell 2000, Bunnell and Zampella 2008). Usually found in or near water, they rarely venture into upland habitats. Carpenter frogs begin calling in April, their breeding period extending into August. They lay eggs in masses with 200 – 600 eggs/mass and may mate more than once each season. Because the larval period may last up to a year, it is critical that ponds retain sufficient water in at least some sections to ensure tadpole survival.

Major threats to these frog species include altered wetland hydrology and water quality, especially changes to water chemistry that elevate pH. The stocking of nonnative predatory fish such as bluegill, black crappie, and largemouth bass in impoundments is also a concern. Raising the pH of acidic Pinelands waters provides an opportunity for these nonnative species to become established (J. Bunnell, personal communication, 2013).

Similarly, two damselflies, the **scarlet bluet** and the **Pine Barrens bluet** also rely on coastal plain ponds for breeding, if the ponds have deeper sections that retain water throughout the year. (The aquatic larval period for odonates typically lasts longer than a year.) The **Pine Barrens bluet** inhabits shallow acidic coastal plain ponds and has a short, early flight season (May and June). They are endemic to the Northeastern U.S. with a limited range, New Jersey being at the southern edge.

The **scarlet bluet** prefers acidic sand-bottomed coastal plain ponds with floating vegetation. It is most abundant from late June through July. Like the Pine Barrens bluet, it is a regional endemic and ranges from New Jersey up the coast to southern Maine (Barlow et al. 2009).

The **golden-winged skimmer** dragonfly is rare in New Jersey and found in sand bottomed ponds. Adults are active from mid May through early October (most commonly seen in July

and August). It is near the northern limit of its range, which extends from southern Massachusetts along the coastal plain south to Florida and west to Texas (Barlow et al. 2009).

The main threats to the odonates include altered hydrology, pollution, and removal of emergent aquatic vegetation that provides critical oviposition and larval habitat (Barlow et al. 2009).

Integrated Conservation Management Guidelines

An important goal of the SWAP is to protect, maintain, and restore critical wetland habitat for SGCN animals. Due to the fact that there are a number of rare taxa with varying habitat preferences that use coastal plain intermittent pond habitats, there is potential for conflicts between conservation management actions proposed for SGCN animals and rare plants at individual sites. For this reason, it is recommended that there be a thorough survey and mapping of all rare species found at a site, including population location, status and condition such that any proposed management can avoid or minimize impacts.
The following integrated conservation management guidelines address broad categories linked to conservation actions identified in the SWAP and correlated with the TRACS ACTIONS Level 1. We have specifically targeted discussion around the actions where there may be potential for management incompatibility between rare plants and SGCN animals.

TRACS ACTIONS

1. Coordination and Administration
2. **Create, Restore, or Enhance Habitat and Natural Processes**
3. **Data Collection and Analysis**
4. Education
5. Facilities and Areas/New Construction
6. Facilities and Areas/Major Renovation
7. Facilities and Areas/Operations and Maintenance
8. Land and Water Rights/Acquisition and Protection
9. Law Enforcement
10. Outreach
11. Planning
12. Species Reintroduction and Stocking
13. Technical Assistance

TRACS ACTION #2:
CREATE, RESTORE, OR ENHANCE NATURAL HABITATS OR PROCESSES

Hydrology and Water Quality Management

An over-arching conservation goal in the SWAP is to maintain hydrology and water chemistry of Pine Barrens wetlands and aquatic habitats. Actions proposed in the SWAP are general, and include land protection, work with public and private landowners, and development of sufficient habitat buffers and landscape connectivity (see SWAP zones –

western Pinelands, Mullica river drainage, southern Pine Barrens, northern Pine Barrens). Each of these action items, if implemented, would benefit to rare plants and wildlife SCGN by maintaining site hydrology of coastal plain intermittent ponds.

Vegetation Management

Managing succession: Active vegetation management is a key component of the SWAP, especially for maintaining early successional wetlands and scrub-shrub habitats. Recommended techniques may include manual removal (e.g., selective cutting and tree removal or mowing), targeted use of herbicides, and/or application of prescribed fire (see below). Currently no woody vegetation management for animal SGCN has been proposed for Pine Barren coastal plain intermittent ponds in the core Pine Barrens. However, any future plans for woody vegetation control or management should keep in mind the life history and habitats needs of the rare plants and other animal SGCN that occur at individual sites to avoid non-target impacts.

> Manual vegetation removal: Hand-pruning or selective cutting of woody vegetation can be used to set back succession and open the canopy for those plant and animal species that require it. If done in the winter months, there will be little impact to coastal plain intermittent pond vegetation or other animal species that use the habitat.
>
> Use of herbicides: Extreme care must be taken if herbicides are used in coastal plain intermittent ponds, as most are broad spectrum. Only direct hand application (e.g. hand painting stump cuts) should be considered for vegetation control adjacent to rare plant populations.

Silvicultural practices on adjacent uplands: Certain forestry practices on lands adjacent to coastal plain intermittent ponds can have a negative effect on pond water quality by increasing soil erosion. Maintaining sufficient uncut buffer at some distance away from the ponds will prevent erosion into the water (which may affect the rare plant community and larval amphibians and odonates). Such buffer will also protect upland habitats used by amphibians like Pine Barrens treefrogs, which move away from the pond to some distance after the breeding season. For example, a 100-foot "no activity" buffer is recommended for forests adjacent to ponds that support Pine Barrens treefrogs and activities such as drum chopping that disturb soil are recommended against (Bunnell, no date). The SWAP recommends working with landowners to promote ecological forestry practices, which would be of benefit to all plants and SGCN animals using coastal plain intermittent pond habitats.

Utility rights-of-way management: The SWAP recommends the development of BMPs for Rights-of-Way (ROW) management for scrub-shrub and animal species that may use them. As ROWs may cross through coastal plain intermittent pond habitats, the development of management guidelines should be coordinated such that all rare plants as well as wildlife SGCN using ROWs are incorporated into BMPs at the same time. This will assist the

landowner in making appropriate management decisions and avoid potentially conflicting recommendations.

Fire Management: Most New Jersey Pine Barrens habitats have been shaped by and are maintained by fire. For this reason, fire management is an ongoing activity, whether by application of prescribed fire for fuel reduction during the winter months or by suppression of hotter growing season burns or wildfires that might affect surrounding development. The way in which fire is managed has a major effect on the persistence and quality of Pine Barrens habitats, including the coastal plain intermittent ponds and their associated rare plants and wildlife SGCN, particularly during times of extreme drought. When considering the use of fire as a management tool in forested landscapes that contain coastal plain intermittent ponds, it is necessary to thoroughly assess what rare plant and animal SGCN are present in the habitat, their tolerances to fire, and their distribution on the landscape before developing a plan for when and if to burn, what to burn and how intensely, or whether fire prevention is warranted. In short, the needs of all species, plant and animal, at a site must be considered. Although hydrology, not fire, is the dominant force shaping coastal plain intermittent pond communities, a better understanding of the historical role of fire in the formation and maintenance of these ponds and their associated rare vegetation is an important research need. Conducting research on fire and its effects on habitats and SGCN animals is another priority goal of the SWAP.

Invasive, Over-abundant, and Pest Species Management

Invasive plant species: Control of invasive species is a conservation goal for all Pine Barrens SWAP landscapes. To date, few invasive or nonnative plant species have been found in core Pine Barrens ponds, although this is a concern in outer Pine Barrens locations such as Bennett Bogs and other coastal plain intermittent ponds in Cape May and Cumberland counties. Should new populations become established, control should begin with the least harmful process (hand pulling or seedhead removal) before moving toward use of chemicals or other less targeted techniques. Biocontrol may be an option for some invasive species, however consultation with experts, both botanists and zoologists is always warranted when considering the use of chemicals and/or biocontrol. Decisions should be made on a site-by-site basis to prevent (or minimize) negative impacts to non-target rare plant or animal species, or to the habitat.

Insect pests and/or disease pathogens: A number of insect pests may be targeted for control in and around coastal plain intermittent ponds (e.g., mosquitoes, southern pine beetle). Control measures often include application of pesticides, many of which are broad spectrum or are applied at times of the year when other invertebrates are vulnerable or are applied in a manner harmful to the rare plant community (e.g., trampling). In the case of the southern pine beetle (*Dendroctonus frontalis*), removal of infested trees and a 50 – 100 foot buffer of uninfested trees to prevent the spread of the outbreak has been recommended. Skidding of trees during removal may harm rare plants and habitats and may increase the possibility of erosion into pond habitats.

Any proposed control measures should be site-specific and the use of integrated pest management and committed, ongoing coordination among agencies and with CPIP managers to reduce non-target impacts is critical. In all cases, botanists and zoologists should be included in the discussion to avoid any potential harm to rare plants or animal SGCN populations or the habitat.

Deer control: Management of deer populations is an important conservation action identified in the SWAP to promote forest health and biodiversity. Deer may consume rare plants and track invasive weed seeds into new habitats (Côté et al. 2004, Rawinski 2008). Management measures may include increased hunting efforts or fencing of vulnerable habitat against deer. Managing the size of local deer herds would benefit both rare plants and animals, and any trampling of vegetation by hunters would occur when most plants are dormant. To date, deer herbivory has not been identified as a major threat in these core coastal plain intermittent ponds but their presence and browsing activity should be regularly monitored.

Beaver control may be needed on occasion in coastal plain intermittent ponds and has also been identified as a conservation action in the SWAP. Typically this could include trapping and removing beaver from a site to prevent dam construction (or partial dam removal), and/or the installation of a water level control device. Since the rare plants and wildlife SGCN using CPIPs all rely on a similar hydrologic regime, beaver control should benefit each. However, keep in mind that beaver impoundments provide good habitat for carpenter frogs. In addition, beaver also maintain the dams when old wooden sluice gates rot away in abandoned cranberry farms that dot the region, also maintaining important habitat for carpenter frogs (J. Bunnell, personal communication, 2013). The need for beaver control should be addressed on a case-by-case basis.

Note: Proper protocols should be put in place for all field biologists to prevent the spread of invasive species propagules and/or disease (e.g., Chytrid fungus, Ranavirus) among wetland sites. It is best to follow these or similar recommendations between site visits: 1) wash boots and field equipment with soap and water; 2) rinse in clean water; and 3) disinfect with a 10% bleach solution and allow to air dry (Dodd 2010; B. Zarate, personal communication, 2013). Note: Pinelands Commission scientists have also adopted a disinfection procedure to use between sites, similar to the above (J. Bunnell, personal communication, 2013). Ranavirus has been confirmed from a number of sites in the Pine Barrens, however to date Chytrid has not been found (K. Monsen, personal communication, 2013).

Recreational Use Management

Regulating ORV and other recreational vehicle use is a goal of the SWAP and ORVs are a threat to some CPIPs (Walz et al. 2006b, Pinelands Preservation Alliance 2013) and associated species (MA Endangered Species Program 2008). Implementation of conservation actions to prohibit or restrict this activity to less sensitive areas, coupled with adequate enforcement, would benefit both rare plants and animals.

The SWAP includes conservation actions encouraging public outreach and education with enhanced public access opportunities. This is an important goal. However, if wildlife viewing structures or trails will be planned for placement near coastal plain intermittent ponds, care must be taken to avoid altering site hydrology, permitting unguided access into vulnerable habitat to avoid trampling and introducing invasive plant seeds, and harming sensitive plants and animals during construction.

SPECIES MANAGEMENT (= TRACS ACTION TARGETS)

Species-Specific Management Actions identified in the SWAP:

Pine Barrens treefrog – The SWAP recommends the development of habitat management and a conservation plan for this species. Development of this plan would not conflict with rare plant management. In fact, it could ensure that any actions for the frog would not inadvertently harm rare plants. Other recommendations for amphibians include monitoring amphibian road crossings to breeding ponds. If roads are located adjacent to coastal plain ponds with breeding amphibians, monitoring and managing amphibian road crossings on rainy nights would not conflict with rare plants at the site.

TRACS ACTION #3:
DATA COLLECTION AND ANALYSIS (TRACS ACTIONS Level 1)
***Research, Survey, or Monitoring* (TRACS ACTIONS Level 2)**

Inventory and Long-term Monitoring

Conducting baseline survey and long term monitoring for all SGCN is a conservation priority in all Pinelands landscape zones. In particular, the Pine Barrens treefrog has been mentioned as a target for this work. Individually, these activities should have minimal impact to the rare plant community (see below for details), but survey and monitoring of multiple species at a site should be coordinated to lessen trampling or other impacts to coastal plain intermittent pond species. In addition, a good first step should be a vegetation assessment that maps the locations of rare plants such that future amphibian or other animal surveys can avoid locations of sensitive plant populations.

Animal survey and monitoring techniques –minimizing harm to plants:

Frog surveys: These surveys are typically conducted at the shoreline by counting calling frogs so there is little, if any trampling of pond vegetation. If other more intensive amphibian population monitoring is required at some future time (e.g., egg mass counts, larval dip net sampling) avoid trampling vegetation or uprooting plants during dip net sampling. If cover boards are used to monitor amphibians in adjacent upland habitats, they should be placed to avoid rare plants that may be growing in those forest openings (J. Bunnell, personal communication, 2013). Consult the plant phenology tables in this report and any rare species maps that are prepared for additional guidance when planning the location and timing of survey work.

Odonate surveys: Dragonfly and damselfly survey and monitoring at a pond could include netting of adults for identification in the hand, searching for larvae in the water and/or exuviae along the pond edge, and specimen collection when deemed necessary. Such activities may trample the plant community so care must be taken during survey work to avoid rare plant locations. Consultation with the plant phenology tables in this report and any rare species maps that are prepared will help avoid harm to rare plants and other sensitive species.

Vernal pool habitat surveys: Surveying for vernal pools has been identified in the SWAP as a priority. While this habitat is classified as "Eastern Woodland Vernal Pool Sparse Vegetation" in the National Vegetation Classification, in NJ calcareous sinkhole ponds are considered to be vernal pool habitat by the Division of Fish and Wildlife. "Vernal habitat" is defined in the NJDEP Freshwater Wetlands Protection Act as a wetland or State open water that meets four criteria including 1) confined basin depression without permanent flowing outlet, 2) evidence of breeding by one or more species of obligate and/or facultative fauna adapted to reproduce in ephemeral aquatic conditions, 3) maintains ponded water for at least two continuous months between March and September of a normal rainfall year, and 4) is free of reproducing fish populations throughout the year, or dries up at some time during a normal rainfall year. See Appendix E for more details and a list of vernal habitat obligate and facultative species. More information can also be found at. Much work has already been done with the use of remote sensing, followed by site visits to verify pond presence (see http://www.nj.gov/dep/fgw/ensp/vernalpool.htm). Typically, site visits to ground-truth remotely-sensed data are easiest to do in the winter when ponds are full of water (or frozen) and there is no ground cover so generally there would be little or no impact to the rare plant community. Site visits in the spring to confirm the presence of obligate wetland species (e.g., wood frogs, fairy shrimp) should also occur early enough in the season to avoid trampling rare plants.

Rare plant survey and monitoring techniques –minimizing harm to animals:

Plant surveys – Plant surveys and rare plant monitoring activities can occur throughout the growing season as phenology differs among species, and over multiple years since growing conditions vary from year to year. Such activities may include random searches through habitat, use of parallel transects, and/or the establishment of long-term vegetation monitoring plots. Rare plant monitoring is an ongoing activity in many of these coastal plain intermittent ponds. Vegetation surveys should be done in a manner that minimizes impacts to frogs or odonates (e.g., avoid stepping on or silting up egg masses or nymphs).

Climate Change Vulnerability Analysis

The year 2012 was the warmest on record nation-wide (NOAA 2013) and in the garden state (Robinson 2013), with more changes forecast to come. In New Jersey the effects of climate change are projected to include: an increase in average temperature (minimum 2-6 °F. increase by 2050) and precipitation (although the exact nature of the change in precipitation may vary across the state); more extreme weather events such as storms and droughts; and sea level rise. Generally we can expect more prolonged summer heat waves

with temperatures above 90° F., and fewer cold days and nights during the winter, which may be of import for those species requiring cold dormancy. Rainfall, especially in the northern part of the state may increase in amount mainly in the winter months (Faass et al. 2012, NJ Climate Adaptation Alliance 2013a).

Coastal Plain Intermittent Ponds and Climate Change:

According to Faass et al. (2012) there are a number of stressors that should be looked at to determine whether or not a particular plant community is vulnerable to climate change. These stressors include: 1) exacerbation of other non-climate stressors; 2) specific hydrologic conditions; 3) vulnerability to human response; 4) sensitivity to extreme climate events; 5) intrinsic adaptive capacity; 6) species vulnerability; 7) latitudinal constraints; 8) management feasibility; 9) degree of cold adaptation; and 10) location in geographical range. (For a detailed discussion of each of these stressors, see Faass et al. 2012.)

Coastal plain intermittent ponds are susceptible to a number of these stressors. These ponds are maintained by specific hydrologic conditions that require a fairly even distribution of precipitation throughout the year. The significant alteration to precipitation patterns anticipated with a changing climate (e.g., greater flood events, increased drought the summer months) may alter groundwater flow and seepage. This may be compounded by increased development at the periphery of the Pine Barrens in future years, putting more pressure on underlying aquifers. This in turn will affect plant and animal species composition, favoring species adapted to drier conditions and possibly permitting greater invasive species incursion (non-climate stressor). Additionally, some coastal plain ponds are maintained in part by periodic fire. Although recent research indicates that in the New Jersey Pine Barrens, wildlife fire spread and severity are not anticipated to change, there are many other factors not included in the models that may come into play, so some uncertainty remains (Clark et al. in press).

Species and Climate Change

Plants: Rare plants of coastal plain intermittent ponds were also assessed for climate vulnerability (see Ring and Spencer 2013) using the NatureServe Climate Change Vulnerability model (NatureServe 2011). One species, slender arrowhead (*Sagittaria teres*), was considered extremely vulnerable. Four species (24%) including Southern boltonia (*Boltonia asteroids* var. *glastifolia*), Boykin's lobelia (*Lobelia boykinii*), awned meadow beauty (*Rhexia aristosa*), and Torrey's bulrush (*Schoenoplectus torreyi*) were considered highly vulnerable. Slender arrowhead is found only in a few counties in New Jersey, extreme eastern Long Island and a few locations in Massachusetts and Rhode Island, and is highly dependent on these coastal plain pond habitats. The other highly vulnerable plants are considered vulnerable for specific life history traits. Eight species (47%) were considered moderately vulnerable to a changing climate including marsh flat sedge (*Cyperus pseudovegetus*), Hirst brothers' panic grass (*Dichanthelium hirstii*), larger buttonweed (*Diodia virginiana*), knotted spike-rush (*Eleocharis equisetoides*), Barton's St. John's-wort (*Hypericum adpressum*), clasping-leaf St. John's-wort (*Hypericum*

gymnanthum), narrow-leaf primrose-willow (*Ludwigia linearis*), and small-head beaked-rush (*Rhynchospora microcephala*). Four (24%) of the state endangered plant species were presumed stable, likely because core pine barren habitats are largely intact and relatively protected from human disturbance. For a more detailed discussion, see Ring and Spencer (2013).

Animals: No CCVAs were completed for the New Jersey SGCN anurans or odonates of coastal plain intermittent ponds and it is unclear how Pine Barrens wetlands will fare in future years. However, the following are some predictions based on life history and consultation with state species experts.

Pine Barrens treefrogs and **carpenter frogs** - Pine Barrens treefrog and carpenter frog populations may remain stable into the near future, as they will breed in a variety of wetland habitats so long as water chemistry is suitable and nonnative frogs and/or fish are not present. Treefrogs would be most sensitive to any changes to the annual cycle of filling and drying, or that alter the length of time that ponds retain water. Treefrogs require predator-free habitat, which the annual drying provides, yet need ponds to retain water long enough for larvae to complete metamorphosis.

Dragonflies and damselflies – All three species of odonates are at the southern edge of their range. Depending on changes to precipitation patterns, and whether Pine Barrens aquifers are significantly lowered due to increased development pressure in the coming years, odonates may not continue to use coastal plain intermittent ponds if they do not retain sufficient water to maintain larval habitat. Although they may be lost from these pond communities, there are likely sufficient remaining permanent wetlands and ponds that can still support these odonates into the future.

Climate Change Summary

There are no specific management recommendations currently proposed in the 2008 SWAP to address climate change for the coastal plain intermittent pond wildlife SGCN highlighted in this report other than maintaining appropriate ecological processes, i.e., site hydrology and wetland connectivity on the landscape and current fire regime. For these reasons, no additional habitat management conflicts are anticipated due to plant and animal species management activities. The coastal plain intermittent pond animal species management actions currently outlined in the SWAP should continue (modified as needed by the recommendations in this report). Addressing existing hydrology and water quality issues, invasive species, recreational overuse, and other threats as necessary to maintain or restore existing habitat will be key to resiliency. The ability of coastal plain intermittent ponds to withstand change over time while retaining their basic structure and function will enable them to support viable populations of rare plants and wildlife SGCN into the future (Anderson and Ferree 2010).

Overall Conclusions:

Based on the information presented in the 2008 SWAP and consultation with species biologists, there are few, if any management actions proposed for SGCN animals in these coastal plain intermittent ponds that would potentially affect the rare plants also occurring in these habitats. In part, this is a result of the fact that many of these ponds occur within a matrix of core Pine Barrens and are relatively well-protected and surrounded by an intact landscape with minimal threats. Intensive survey and monitoring of multiple species at individual sites would cause harm to rare species and habitat, and therefore regular communication and coordination of activities among organizations and others working in these habitats is critical.

CONCLUSIONS

In this report, we have provided guidelines for how to comprehensively manage for rare plants and SGCN animals in four rare wetland habitats; Pine Barrens savannas, coastal plain intermittent ponds, calcareous fens, and calcareous sinkhole ponds. These management guidelines are intended to serve as a model for how the needs of both rare plants and animals can be incorporated into more comprehensive management planning. Robust natural habitats (ecological communities) are vital to thriving animal populations hence compatible management is the key to habitat and population resilience. It is important that both plants and animals be considered when developing management plans for wildlife species of conservation concern as the plant community is an integral component of the required habitat.

In many cases, as long as broad threats are addressed such that the systems that shape the habitat type remain in place (hydrologic or fire regimes, for example) then plant and animal management at sites may be compatible as all benefit from actions that maintain the landscape, key features, and ecological processes.

In some cases, the methods of management may need to be modified to meet specific challenges (e.g., not use chemicals near rare plants or sensitive amphibian species), or the timing of activities will need to be modified (e.g., coordinating survey and monitoring activities at a site to avoid tramping of habitat).

Occasionally, decisions will have to be made on case by case basis for what a site will be "best" managed for, where management needs of two or more species are diametrically opposed (e.g., golden-winged warbler and Schweitzer's buckmoth require shrubby vegetation whereas the bog turtle and queen-of-the-prairie require open habitats). To accomplish this, a thorough assessment (of species and threats) in all rare habitats of a certain type in the state (all calcareous fens, for example) and an understanding of the scope of proposed management activities on both public *and private* lands is recommended.
Climate change adds an extra layer of complexity to the development of long-term management plans. Although no species-specific management actions have been proposed to date for SGCN animals, this may change in the 2015 revision. Ultimately, decisions may need to be made as to how to prioritize and select species for active conservation and management, based on climate change prediction models.

In preparing this report, a number of other issues came to light.

1. For any species and habitats on state-owned property, there is an agency internal management review committee (the Natural and Historic Resources Land Management Review, Policy Directive 2008-1) that coordinates proposed management actions to minimize negative impacts to non-target species. However, some of these habitats (especially calcareous fens) are owned privately and managed by homeowners in consultation with NGOs or agencies such as the NRCS. In such cases, site management may be focused on single species management with

little or no coordination or consultation so that rare plants may be overlooked in the planning process, or conflicts with other animals using the sites may occur (shrub-nesting birds vs. bog turtles, for example). Landowners and other organizations should be strongly encouraged to refer to the SWAP for management guidelines. In addition, for these and other rare habitats it may be beneficial to establish a group of experts to review the status of particular habitats on both public and private land to ensure that the needs of endangered plants and wildlife SGCN are being adequately addressed among all sites.

2. In this report we are only looking at state wildlife species of conservation need or state endangered (S1) plant species. There are other species that although they may not be "rare," are considered to have exemplary populations or are key elements of a particular natural community (e.g., bog birch and other shrubs in calcareous fens). Ideally, these other species should also be considered with planning for management at sites.

3. It is interesting to note that the most potential conflict was observed in the Skylands region in the calcareous fens, not in the core Pine Barrens habitats. Strong landscape-level protection coupled with the work of watchdog groups over the years has resulted in a relatively natural system with many fewer stresses than in areas without such comprehensive land use policies. Outside the Pine Barrens or core areas of the Highlands Region, most New Jersey habitats are fragmented and/or degraded, and species there face multiple threats, necessitating ongoing site-specific management for population persistence rather than broad landscape level or systems management.

4. Ongoing communication and coordination is critical. The DEP Natural and Historic Resources Land Management Review process is an excellent tool for this within the Department. Extending such collaboration and coordination outside the Department with other agencies and organizations, as noted in the SWAP, is also recommended as is continued collaboration between the New Jersey Endangered and Nongame Species Program and the Natural Heritage Program/Office of Natural Lands Management as the SWAP is revised in the coming months.

5. Development of Best Management Plans for landowners and others as part of the SWAP, should address both wildlife SGCN and rare plants, to the extent possible. This will ensure that conflicting management recommendations are not inadvertently presented.

6. The New Jersey habitat-based approach worked well for incorporating rare plants into WAPs, as well as linking rare plants and wildlife SGCN by habitat for protection and integrated management. Habitat became an essential component of conducting the CCVI for 70 state endangered plant species – many assessments of species could not be done without an understanding of specific habitat responses to projected climate change. This worked mainly because the state endangered species chosen for the study had a high fidelity to the rare habitats chosen (calcareous fen,

calcareous sinkhole pond, coastal plain intermittent pond, Pine Barren savanna). In fact, the habitat focus for integrated management was crucial for more than climate change – it drove the entire assessment in the context of Wildlife CMP Threats and TRACS Actions frameworks (unified lexicon being used in WAPs).

In addition to coordinating management activities at sites with wildlife SGCN animals and rare plants, public education is an important tool. For all the actions included in the SWAP, whether small backyard habitat projects or larger-scale landowner incentive programs enhanced public education about species and habitats is critical. Providing a greater awareness about New Jersey's biodiversity to strengthen environmental literacy would greatly benefit all New Jersey's species. An additional goal should be to also include information about plants in any public outreach. In the same manner that invertebrates have been overlooked, so, too have plants. Public education and outreach about New Jersey's species of greatest conservation need should also include information about the state's unique and rare plants. People often suffer from "plant blindness", where plants are considered just a green backdrop to the landscape rather than accorded the importance they deserve.

Because New Jersey's landscapes have been so significantly altered and protected habitats are limited, for the most part we must meet the conservation needs of plants and animals (in fact, all biodiversity) at the same locations. While recognizing that there may be individual species management actions that must be undertaken, depending on the species, managing for habitat resilience is the most important management action we can take. To succeed, we need to take into consideration all habitat components; the ecological processes that create and maintain the habitat and the plants and animals that occur there. Managing for one apart from the whole will not work in today's New Jersey.

References Cited:

Anderson M.G. and C.E. Ferree. 2010. Conserving the stage: Climate change and the geophysical underpinnings of species diversity. PLoS ONE 5(7): e11554. doi:10.1371/journal.pone.0011554

Barlow, A.E., D.M. Golden, and J. Bangma. 2009. Field Guide to dragonflies and damselflies of New Jersey. PSI Flemington, NJ. 285p.

Bedford, Barbara L. and Kevin S. Godwin. 2003. Fens of the United States: Distribution, characteristics, and scientific connection versus legal isolation. Wetlands 23(3): 608-629

Breden, T.F., J.M. Hartman, M. Anzelone, and J.F. Kelly. 2006. Endangered plant species protection in New Jersey: Health and threats. New Jersey Department of Environmental Protection, Division of Parks and Recreation, Office of Natural Lands Management, Natural Heritage Program, Trenton, NJ.

Buchanan, A.N. 2006. Ecology of small mammals in the New Jersey Pinelands with special reference to the southern bog lemming (*Synaptomys cooperi*) and meadow jumping mouse (*Zapus hudsonius*). MS thesis, Drexel University, PA. 128p.

Bunnell, J.F. no date. Forestry for Pine Barrens treefrogs. New Jersey Pinelands Commission, New Lisbon, NJ.

Bunnell, J.F. and J.L. Ciraolo. 2010. The potential impact of simulated ground-water withdrawals on the oviposition, larval development, and metamorphosis of pond-breeding ponds. Wetlands Ecology and Management 18:495-509.

Bunnell, J.F. and R.A. Zampella. 2008. Native fish and anuran assemblages differ between impoundments with and without non-native Centrarchids and bullfrogs. Copeia 4:931-939.

Cech, R. and G. Tudor. 2005. Butterflies of the East Coast-an observer's guide. Princeton University Press, Princeton, NJ. 345p.

Clark, K.L., N. Skowronski, H. Renninger, and R. Scheller. In press. Potential Impacts of Climate Change on Fire Management in the mid-Atlantic Region. Forest Ecology and Management.

Colburn, E. 2004. Vernal pools: natural history and conservation. The McDonald & Woodward Publishing Company, Blacksburg, VA. 426p.

Côté, S.D., T.P. Rooney, J.P. Tremblay, C. Dussault, and D.M. Waller. 2004. Ecological impacts of deer overabundance. Annual Review of Ecology, Evolution, and Systematics 35:113-147.

Dodd, C.K., Jr., ed. 2010. Amphibian ecology and conservation. Oxford University Press, New York, NY. 556p.

Ernst, C.H., J.E. Lovich, and R.W. Barbour. 1994. Turtles of the United States and Canada. Smithsonian Institution Press, Washington, D.C. 578p.

Faass, J.S., V. Truesdale, and J. Herb. 2012. DRAFT REPORT. Preparing New Jersey's habitats for a changing climate: An assessment of vulnerability. A report prepared for the NJ Department of Environmental Protection by the Environmental Analysis and Communications Group, Edward J. Bloustein School of Planning and Public Policy, Rutgers, the State University of New Jersey. 159p.

Furedi, M., B. Leppo, M. Kowalski, T. Davis, and B. Eichelberger. 2011. Identifying species in Pennsylvania potentially vulnerable to climate change. Pennsylvania Natural Heritage Program, Western Pennsylvania Conservancy, Pittsburgh, PA. 229p. http://www.naturalheritage.state.pa.us/ccvi/CCVI_final_report.pdf

Gawler, S.C. 2008. Northeast terrestrial wildlife habitat classification: The Northeast habitat classification and mapping project: report to the Virginia Department of Game and Inland Fisheries on behalf of the Northeast Association of Fish and Wildlife Agencies for the National Fish and Wildlife Foundation (NFWF Project 2006-0181-003). NatureServe, Boston, MA.

Gochfeld, M. and J. Burger. 1997. Butterflies of New Jersey. Rutgers University Press, New Brunswick, NJ. 327p.

Golden, D. 2003. Silver-bordered fritillary. Pages 254-256 in Beans, B.E. and L. Niles, eds. Endangered and threatened wildlife of New Jersey. Rutgers University Press, New Brunswick, NJ. 303p.

Hamm, C.A., B.L. Williams, and D.A. Landis. 2013. Natural history and conservation status of the endangered Mitchell's satyr butterfly: Synthesis and expansion of our knowledge regarding *Neonympha mitchellii mitchellii* French 1889. Journal of the Lepidopterists' Society 67(1):15 -28.

Hasse, J. and R. Lathrop. 2010. Urban growth and open space loss in NJ 1986 thru 2007. Rowan University, Glassboro, NJ, and Rutgers University, Grant F. Walton Center for Remote Sensing and Spatial Analysis, New Brunswick, NJ.

Hays, M. 2001. Conservation assessment for rough cotton-grass (*Eriophorum tenellum*). USDA Forest Service.

Heyer, W.R., M.A. Donnelly, R.W. McDiarmid, L.C. Hayek, and M.S. Foster, eds. 1994. Measuring and monitoring biological diversity: standard methods for amphibians. Smithsonian Institution Press, Washington, D.C. 364p

Hollingshead, N. 2011. Southern bog lemming. in Protecting Southern Appalachian Wildlife in an Era of Climate Change. Open Space Institute, IL.

Kelley, J., S. Williamson, and T.R. Cooper. 2008. American Woodcock conservation plan: A summary of and recommendations for woodcock conservation in North America. Wildlife Management Institute, Washington, D.C. 163 p.

Kenney, L.P. and M.R. Burne. 2000. Salamanders, frogs and turtles of New Jersey's vernal pools – a field guide. New Jersey Department of Environmental Protection, Endangered and Nongame Species Program. Trenton, NJ.

Laidig, K.J. 2010. The potential impact of simulates water-level reductions on intermittent pond vegetation. Pinelands Commission, New Lisbon, NJ. 19p.

Leck, C. 1979. Birds of the Pine Barrens. Pages 457-466 in Forman, R.T.T. ed. Pine Barrens ecosystems and landscapes. Rutgers University Press, New Brunswick, NJ. 601 p.

Liguori, S. and J. Tesauro. 2003. Bog turtle. Pages 176-180 in Beans, B.E. and L. Niles, eds. Endangered and threatened wildlife of New Jersey. Rutgers University Press, New Brunswick, NJ. 303p.

Little, C. 1979. Fire and plant succession in the New Jersey Pine Barrens. Pages 297-314 in Forman, R.T.T., ed. Pine Barrens: Ecosystem and landscape. Academic Press, New York, NY.

Matthews, S.N., L.R. Iverson, A.M. Prasad, A.M., and M.P. Peters. 2007-ongoing. A Climate Change Atlas for 147 Bird Species of the Eastern United States, Northern Research Station, USDA Forest Service, Delaware, OH. http://www.nrs.fs.fed.us/atlas/bird (viewed 6 February 2013).

National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Center. 2013. State of the climate: national overview for annual 2012. http://www.ncdc.noaa.gov/sotc/national/ (viewed 29 January 2013).

Natural Heritage and Endangered Species Program. 2008. Pine Barrens bluet. Massachusetts Division of Fish and Wildlife. http://www.mass.gov/dfwele/dfw/nhesp/species_info/nhfacts/enallagma_recurvatum.pdf (viewed 2 June 2013).

NatureServe. 2011. Guidelines for Using the NatureServe Climate Change Vulnerability Index, Release 2.1. April 2011. http://www.natureserve.org/prodServices/climatechange/ccvi.jsp

NatureServe. 2013a. Mitchell's Satyr. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer (viewed 26 March 2013).

NatureServe. 2013b. Schweitzer's Buckmoth. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer (viewed 23 January 2013).

NatureServe. 2013c. Helicta satyr. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer (viewed 6 April 2013).

New Jersey Climate Adaption Alliance. 2013a. Climate change in New Jersey: trends and projections. http://climatechange.rutgers.edu/njadaptpdfs/ClimateImpacts/Trends_Projections.pdf (viewed 22 May 2013).

New Jersey Climate Adaptation Alliance. 2013b. A Summary of climate change impacts and preparedness opportunities affecting natural resources in New Jersey. http://climatechange.rutgers.edu/njadaptpdfs/ClimateImpacts/NJCAA-workingbrief-naturalresources.pdf (viewed 19 April 2013).

New Jersey Department of Environmental Protection (NJDEP). 2008. New Jersey Wildlife Action Plan. Division of Fish & Wildlife, Endangered & Nongame Species Program, Trenton, NJ. http://www.state.nj.us/dep/fgw/ensp/waphome.htm

New Jersey Department of Environmental Protection (NJDEP). 2010. NJDEP 2007 Land Use/Land Cover. http://www.state.nj.us/dep/gis/lulc07cshp.html

New Jersey Division of Fish and Wildlife. 2012. New Jersey Landscape Project, Version 3.1. New Jersey Department of Environmental Protection, Division of Fish and Wildlife, Endangered and Nongame Species Program. pp. 33. http://www.state.nj.us/dep/fgw/ensp/landscape/lp_report_3_1.pdf

New Jersey Division of Fish and Wildlife. 2011. New Jersey's Landscape Project: Frequently Asked Questions. New Jersey Department of Environmental Protection, Division of Fish and Wildlife, Endangered and Nongame Species Program, Trenton, NJ. 25pp. http://www.state.nj.us/dep/fgw/ensp/landscape/

Nikula, B., J. L. Loose, and J.R. Burne. 2003. A field guide to the dragonflies and damselflies of Massachusetts. Massachusetts Division of Fisheries and Wildlife, Natural Heritage & Endangered Species Program, Westborough, MA. 197p.

Petranka, J.W. 1998. Salamanders of the United States and Canada. Smithsonian Institution Press, Washington, D.C. 587p.

Pinelands Preservation Alliance. 2013. Off-road vehicles. http://www.pinelandsalliance.org/protection/hotissues/ecological/offroadvehicles/ (viewed 2 June 2013).

Rawinski, T.J. 2001. *Scirpus longii* Fern. (Long's bulrush) Conservation and Research Plan for New England. New England Wild Flower Society, Framingham, Massachusetts,

Rawinski, T.J. 2008. Impacts of white-tailed deer overabundance in forest ecosystems: An overview. U.S. Department of Agriculture, Forest Service, Newtown Square, PA. 8p.

Ring, R.M., and E.A. Spencer. 2013. Vulnerability of 70 plant species of greatest conservation need to climate change in New Jersey. 2012. New York Natural Heritage Program, Albany, NY. 35p.

Robinson, D.A. 2013. Finishing the Year on a Mild and Damp Note: December 2012 Report Sandy and Record Warmth: 2012 Annual Report. http://climate.rutgers.edu/stateclim/?section=menu&%20target=dec12 (viewed 19 April 2013).

Sadinski, W.J. and W.A. Dunson. 1992. A Multilevel study of effects of low pH on amphibians of temporary ponds. Journal of Herpetology 26(4):413-422.

Salafsky, N., D. Salzer, A.J. Stattersfield, C. Hilton-Taylor, R. Neugarten, S.H.M. Butchart, B. Collen, N. Cox, L.L. Master, S. O'Connor, and D. Wilkie. 2008. A Standard lexicon for biodiversity conservation: Unified classifications of threats and actions. Conservation Biology 22:897-911.

Schlesinger, M.D., J.D. Corser, K.A. Perkins, and E.L. White. 2011. Vulnerability of at-risk species to climate change in New York. New York Natural Heritage Program, Albany, NY. 61p.

Schweitzer, D.F., M.C. Minno, and D.L. Wagner. 2011. Rare, declining, and poorly known butterflies and moths (Lepidoptera) of forests and woodlands in the Eastern United States. U.S. Forest Service, Forest Health Technology Enterprise Team, HFTET-2011-01. 517p.

Snyder, D. and S.R. Kaufman. 2004. An overview of nonindigenous plant species in New Jersey. New Jersey Department of Environmental Protection, Division of Parks and Forestry, Office of Natural Lands Management, Natural Heritage Program, Trenton, NJ. 107p.

Stein, B.A. and K. Gravuer. 2008. Hidden in plain sight: The role of plants in state wildlife action plans. NatureServe, Arlington, VA.

Switalski, T.A. and A. Jones. 2012. Off-road vehicle best management practices for forestlands: A review of scientific literature and guidance for managers. Journal of Conservation Planning 8:12-24.

Tarof, S. and J.V. Briskie. 2008. Least Flycatcher (*Empidonax minimus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/099

U.S. Fish and Wildlife Service. 2001. Bog Turtle (*Clemmys muhlenbergii*), Northern Population, Recovery Plan. Hadley, MA. 103p.

U.S. Fish and Wildlife Service. 2013. Wildlife tracking conservation actions. http://www.wildlifetracs.us/

Walsh, J., V. Elia, R. Kane, and T. Halliwell. 1999. Birds of New Jersey. New Jersey Audubon Society, Bernardsville, NJ. 704p.

Walz, K.S., R.J. Canace, J.B., R.Witte, M.S. Serfes, W. Honachefsky, J. Kurtz, and R. Dutko. 2000. Identification and protection of reference wetland natural communities in New Jersey: Calcareous sinkhole ponds of the Kittatinny Valley. New Jersey Department of Environmental Protection, Division of Parks and Forestry, Office of Natural Lands Management, Natural Heritage Program, Trenton, NJ. 260p. + Appendices.

Walz, K.S. 2006. Protection of globally imperiled wetlands in the Kittatinny Valley of New Jersey. New Jersey Department of Environmental Protection, Division of Parks and Forestry, Office of Natural Lands Management, Natural Heritage Program, Trenton, NJ. 110p.

Walz, K.S., S. Stanford, J. Boyle, and E.W.F. (Russell) Southgate. 2006a. Pine Barren Riverside Savannas of New Jersey. New Jersey Department of Environmental Protection, Division of Parks and Forestry, Office of Natural Lands Management, Natural Heritage Program, Trenton, NJ. 169p. + Appendices.

Walz, K.S., S. Stanford, N.L. Adamson, L. Kelly, K. Anderson, K. Laidig, and J. Bunnell. 2006b. Coastal plain intermittent pondshore communities of New Jersey. New Jersey Department of Environmental Protection, Division of Parks and Forestry, Office of Natural Lands Management, Natural Heritage Program, Trenton, NJ. 50p.

Walz, K.S., K. Anderson, L. Kelly, A.Windisch, and M. Wong. 2012. Draft New Jersey ecological community crosswalk: A tool for the identification of habitats across jurisdictional boundaries. New Jersey Department of Environmental Protection, Division of Parks and Forestry, Office of Natural Lands Management, Natural Heritage Program, Trenton, NJ.

Whittaker, J.O., Jr., and W.J. Hamilton, Jr., 1998. Mammals of the Eastern United States. Cornell University Press, Ithaca, NY. 583p.

Zampella, R.A. and J.F. Bunnell. 2000. The distribution of anurans in two river systems of a coastal plain watershed. Journal of Herpetology 34(2):210-221.

Appendix A

- ✧ List of Rare Plants with Protection Status and Rarity Rank
- ✧ Special Plants of NJ Categories & Definitions
- ✧ List of Wildlife Species of Conservation Need (SGCN) with Protection Status and Rarity Rank
- ✧ NJ Endangered and Nongame Species Program Special Concern Species Status Listing Status Definitions:

List of Selected State Endangered Plant Species with Protection Status and Rarity Rank

SCIENTIFIC NAME	**COMMON NAME**	**Fed Status**	**State Prot Status**	**Global Rarity Rank**	**State Rarity Rank**
Alisma triviale	Large Water-plantain		E	G5	S1
Andromeda glaucophylla	Bog Rosemary		E	G5T5	S1
Aster borealis	Rush Aster		E	G5	S1
Boltonia asteroides var. glastifolia	Southern Boltonia		E	G5TNR	S1
Boltonia montana	Appalachian Mountain Boltonia			G1G2	S1S2
Calamagrostis pickeringii	Pickering's Reed Grass		E	G4	S1
Carex alopecoidea	Foxtail Sedge		E	G5	S1
Carex aquatilis	Water Sedge		E	G5	S1
Carex diandra	Lesser Panicled Sedge			G5	S1
Carex formosa	Handsome Sedge		E	G4	S1.1
Carex haydenii	Cloud Sedge		E	G5	S1
Carex lupuliformis	Hop-like Sedge		E	G4	S1
Carex pseudocyperus	Cyperus-like Sedge		E	G5	S1
Carex tuckermanii	Tuckerman's Sedge		E	G4	S1
Carex woodii	Wood's Sedge			G4	S1.1
Cleistes divaricata	Spreading Pogonia		E	G4	S1
Coelorachis rugosa	Wrinkled Jointgrass		E	G5	S1
Comarum palustris	Marsh Cinquefoil		E	G5	SH
Conioselinum chinense	Hemlock-parsley		E	G5	S1
Cyperus pseudovegetus	Marsh Flat Sedge		E	G5	S1
Cypripedium candidum	Small White Lady's-slipper		E	G4	S1
Cypripedium reginae	Showy Lady's-slipper		E	G4	S1
Diodia virginiana	Larger Buttonweed		E	G5T5	S1
Eleocharis equisetoides	Knotted Spike-rush		E	G4	S1
Eleocharis quinquefolia	Few-flower Spike-rush		E	G5	S1
Equisetum variegatum	Variegated Horsetail		E	G5T5	S1
Eriophorum tenellum	Rough Cotton-grass		E	G5	S1
Eupatorium resinosum	Pine Barren Boneset		E	G3	S2
Filipendula rubra	Queen-of-the-prairie		E	G4G5	SX
Galium labradoricum	Labrador Marsh Bedstraw		E	G5	S1
Galium trifidum	Small Bedstraw		E	G5T5	S2
Glyceria borealis	Small Floating Manna Grass		E	G5	SH.1
Hottonia inflata	Featherfoil		E	G4	S1
Hypericum adpressum	Barton's St. John's-wort		E	G3	S2
Hypericum gymnanthum	Clasping-leaf St. John's-wort			G4	S1
Hypericum majus	Larger Canadian St. John's Wort		E	G5	S1
Juncus caesariensis	New Jersey Rush		E	G2	S2
Lobelia boykinii	Boykin's Lobelia		E	G2G3	S1
Ludwigia linearis	Narrow-leaf Primrose-willow			G5	S1

SCIENTIFIC NAME	**COMMON NAME**	**Fed Status**	**State Prot Status**	**Global Rarity Rank**	**State Rarity Rank**
Megalodonta beckii	Water-marigold		E	G4G5	S1
Narthecium americanum	Bog Asphodel	C	E	G2	S2
Neobeckia lacustris	Lake Water-cress		E	G4?	SH
Panicum boreale	Northern Panic Grass		E	G5	S1
Panicum flexile	Wiry Panic Grass		E	G5	S1
Panicum hirstii	Hirst Brothers' Panic Grass	C	E	G1	S1
Platanthera integra	Yellow Fringeless Orchid		E	G3G4	S1
Rhexia aristosa	Awned Meadow-beauty		E	G3	S1
Rhynchospora capillacea	Capillary Beaked-rush		E	G4	S1
Rhynchospora knieskernii	Knieskern's Beaked-rush	LT	E	G2	S2
Rhynchospora microcephala	Small-head Beaked-rush		E	G5T5	S1
Rudbeckia fulgida	Orange Coneflower		E	G5T4?	S1
Sagittaria cuneata	Arum-leaf Arrowhead		E	G5	S1
Sagittaria teres	Slender Arrowhead		E	G3	S1
Salix lucida ssp. lucida	Shining Willow			G5T5	S1
Salix pedicellaris	Bog Willow		E	G5	S1
Schoenoplectus torreyi	Torrey's Bulrush		E	G5?	S1
Scirpus longii	Long's Woolgrass		E	G2G3	S2
Sisyrinchium montanum	Strict Blue-eyed Grass		E	G5T4T5	S2
Sparganium natans	Small Burr-reed		E	G5	S1
Spiranthes laciniata	Lace-lip Ladies'-tresses		E	G4G5	S1
Thuja occidentalis	Arborvitae		E	G5	S1
Tofieldia racemosa	False Asphodel		E	G5	S1
Triglochin maritima	Seaside Arrow-grass		E	G5	S1
Trollius laxus ssp. laxus	Spreading Globe Flower		E	G4T3	S1
Utricularia minor	Lesser Bladderwort		E	G5	S1
Utricularia olivacea	Dwarf White Bladderwort		E	G4	S1.1
Utricularia resupinata	Reversed Bladderwort		E	G4	S1
Veronica catenata	Sessile Water-speedwell		E	G5	S1
Xyris fimbriata	Fringed Yellow-eyed-grass		E	G5	S1
Zigadenus leimanthoides	Death-camus		E	G4Q	S1

SOURCE: New Jersey Natural Heritage Program, Biotics Database

Special Plants of NJ - - Categories & Definitions

http://www.nj.gov/dep/parksandforests/natural/heritage/spplant_ap1.html

Plants:

Plant taxa listed as endangered are from New Jersey's official Endangered Plant Species List (N.J.A.C. 7:5C – 5.1).

E Native New Jersey plant species whose survival in the State or nation is in jeopardy.

REGIONAL STATUS CODES FOR PLANTS AND ECOLOGICAL COMMUNITIES

LP Indicates taxa listed by the Pinelands Commission as endangered or threatened within their legal jurisdiction. Not all species currently tracked by the Pinelands Commission are tracked by the Natural Heritage Program. A complete list of endangered and threatened Pineland species is included in the New Jersey Pinelands Comprehensive Management Plan.

HL Indicates taxa or ecological communities protected by the Highlands Water Protection and Planning Act within the jurisdiction of the Highlands Preservation Area.

EXPLANATION OF GLOBAL AND STATE ELEMENT RANKS

The Nature Conservancy developed a ranking system for use in identifying elements (rare species and ecological com-munities) of natural diversity most endangered with extinction. Each element is ranked according to its global, national, and state (or subnational in other countries) rarity. These ranks are used to prioritize conservation work so that the most endangered elements receive atten-tion first. Definitions for element ranks are after The Nature Conservancy (1982: Chapter 4, 4.1-1 through 4.4.1.3-3).

GLOBAL ELEMENT RANKS

G1 Critically imperiled globally because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especial-ly vulnerable to extinction.

G2 Imperiled globally because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extinction throughout its range.

G3 Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range (e.g., a single western state, a physiogra-phic region in the East) or because of other factors making it vulnerable to extinction throughout its range; with the number of occurrences in the range of 21 to 100.

G4 Apparently secure globally; although it may be quite rare in parts of its range, especially at the periphery.

G5 Demonstrably secure globally; although it may be quite rare in parts of its range, especia-lly at the periphery.

GH Of historical occurrence throughout its range i.e., formerly part of the established biota, with the expectation that it may be rediscovered.

GU Possibly in peril range-wide but status uncertain; more information needed.

GX Believed to be extinct throughout range (e.g., passenger pigeon) with virtually no likelihood that it will be rediscovered.

G? Species has not yet been ranked.

GNR Species has not yet been ranked.

STATE ELEMENT RANKS

S1 Critically imperiled in New Jersey because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres). Elements so ranked are often restricted to very specialized conditions or habitats and/or restricted to an extremely small geographical area of the state. Also included are elements which were formerly more abundant, but because of habitat destruction or some other critical factor of its biology, they have been demonstrably reduced in abundance. In essence, these are elements for which, even with intensive searching, sizable additional occurrences are unlikely to be discovered.

S2 Imperiled in New Jersey because of rarity (6 to 20 occurrences). Historically many of these elements may have been more frequent but are now known from very few extant occurrences, primarily because of habitat destruction. Diligent searching may yield additional occurrences.

S3 Rare in state with 21 to 100 occurrences (plant species and ecological communities in this category have only 21 to 50 occurrences). Includes elements which are widely distributed in the state but with small populations/acreage or elements with restricted distribution, but locally abun-dant. Not yet imperiled in state but may soon be if current trends continue. Searching often yields additional occurrences.

S4 Apparently secure in state, with many occurrences.

S5 Demonstrably secure in state and essentially ineradicable under present conditions.

SA Accidental in state, including species (usually birds or butterflies) recorded once or twice or only at very great intervals, hundreds or even thousands of miles outside their usual range; a few of these species may even have bred on the one or two occasions they were recorded; examples include European strays or western birds on the East Coast and vice-versa.

SE Elements that are clearly exotic in New Jersey including those taxa not native to North America (introduced taxa) or taxa deliberately or accidentally introduced into the State from other parts of North America (adventive taxa). Taxa ranked SE are not a conservation priority (viable introduced occurrences of G1 or G2 elements may be exceptions).

SH Elements of historical occurrence in New Jersey. Despite some searching of historical occurrences and/or potential habitat, no extant occurrences are known. Since not all of the historical occurrences have been field surveyed, and unsearched potential habitat remains,

historically ranked taxa are considered possibly extant, and remain a conservation priority for continued field work with the expectation they may be rediscovered.

SP Element has potential to occur in New Jersey, but no occurrences have been reported.

SR Elements reported from New Jersey, but without per-suasive documentation which would provide a basis for either accepting or rejecting the report. In some instances documentation may exist, but as of yet, its source or location has not been determined.

SRF Elements erroneously reported from New Jersey, but this error persists in the literature.

SU Elements believed to be in peril but the degree of rarity uncertain. Also included are rare taxa of uncertain taxonomical standing. More information is needed to resolve rank.

SX Elements that have been determined or are presumed to be extirpated from New Jersey. All historical occurrences have been searched and a reasonable search of potential habitat has been completed. Extirpated taxa are not a current conservation priority.

SXC Elements presumed extirpated from New Jersey, but native populations collected from the wild exist in cultivation.

SZ Not of practical conservation concern in New Jersey, because there are no definable occurrences, although the taxon is native and appears regularly in the state. An SZ rank will generally be used for long distance migrants whose occurrences during their migrations are too irregular (in terms of repeated visitation to the same locations), transitory, and dispersed to be reliably identified, mapped and protected. In other words, the migrant regularly passes through the state, but enduring, mappable element occurrences cannot be defined.

Typically, the SZ rank applies to a non-breeding population (N) in the state - for example, birds on migration. An SZ rank may in a few instances also apply to a breeding population (B), for example certain lepidoptera which regularly die out every year with no significant return migration.

Although the SZ rank typically applies to migrants, it should not be used indiscriminately. Just because a species is on migration does not mean it receives an SZ rank. SZ will only apply when the migrants occur in an irregular, transitory and dispersed manner.

B Refers to the breeding population of the element in the state.

N Refers to the non-breeding population of the element in the state.

T Element ranks containing a "T" indicate that the infraspecific taxon is being ranked differently than the full species. For example Stachys palustris var. homotricha is ranked

"G5T? SH" meaning the full species is globally secure but the global rarity of the var. homotricha has not been determined; in New Jersey the variety is ranked historic.

Q Elements containing a "Q" in the global portion of its rank indicates that the taxon is of questionable, or uncertain taxonomical standing, e.g., some authors regard it as a full species, while others treat it at the subspecific level.

.1 Elements only, ever documented from a single location.
Note: To express uncertainty, the most likely rank is assigned and a question mark added (e.g., G2?). A range is indicated by combining two ranks (e.g., G1G2, S1S3).

IDENTIFICATION CODES

These codes refer to whether the identification of the species or community has been checked by a reliable individual and is indicative of significant habitat. These codes are not included on all Natural Heritage Reports.

Y Identification has been verified and is indicative of significant habitat.

BLANK Identification has not been verified but there is no reason to believe it is not indicative of significant habitat.
? Either it has not been determined if the record is indicative of significant habitat or the identification of the species or community may be confusing or disputed.

List of selected Wildlife Species of Conservation Need with Protection Status and Rarity Rank

Animal Type	Common name	*Scientific name*	Fed Status	State Status (ENSP)	Global Rarity Rank	State Rarity Rank
Amphibian	Pine barrens treefrog	*Hyla andersonii*		**T**	G4	S2
Amphibian	Jefferson salamander	*Ambystoma jeffersonianum*		SC	G4	S3
Amphibian	Marbled salamander	*Ambystoma opacum*		SC	G5	S3
Amphibian	Long-tailed salamander	*Eurycea longicauda longicauda*		**T**	G5	S2
Amphibian	Carpenter frog	*Lithobates virgatipes*		SC	G4	S3
Bird	Winter wren	*Troglodytes hiemalis*		SC	G5	S3B,S4N
Bird	Veery	*Catharus fuscescens*		SC	G5	S3B
Bird	Sedge wren	*Cistothorus platensis*		**E**	G5	S1B, S1N
Bird	Black-billed cuckoo	*Coccyzus erythropthalmus*		SC	G5	S3B
Bird	Least flycatcher	*Empidonax minimus*		SC	G5	S3B
Bird	Red-headed woodpecker	*Melanerpes erythrocephalus*		**T**	G5	S2B, S2N
Bird	Northern parula *	*Setophaga (Parula) americana*		SC	G5	S3B
Bird	American woodcock	*Scolopax minor*			G5	S5
Bird	Golden-winged warbler	*Vermivora chrysoptera*		**E**	G4	S3B, S3N
Bird	Canada warbler	*Cardellina (Wilsonia) canadensis*		SC	G5	S3B
Butterfly	Arogos skipper	*Atrytone arogos arogos*		**E**	G3T1T2	S1
Butterfly	Silver-bordered Fritillary	*Boloria selene myrina*		**T**	G5	S2
Butterfly	Georgia Satyr = Helicta Satyr	*Neonympha areolata septentrionalis (=Neonympha helicta)*		SC	G3G4	S3
Butterfly	Mitchell's Satyr	*Neonympha mitchellii mitchellii*	**E**	**E**	G2T2	S1
Dragonfly	Scarlet Bluet	*Enallagma pictum*		SC	G3	S3
Dragonfly	Pine Barrens Bluet	*Enallagma recurvatum*		SC	G3	S3
Dragonfly	Golden-winged skimmer	*Libellula auripennis*		SC	G5	S3
Dragonfly	Kennedy's Emerald	*Somatochlora kennedyi*		**T**	G5	S3
Dragonfly	Brush-tipped Emerald	*Somatochlora walshii*		SC	G5	S3
Mammal	Southern bog lemming	*Synaptomys cooperi*			G5	S2
Moth	Moth	*Dichagyris reliqua*			G2G3	S1
Moth	Schweitzer's buckmoth	*Hemileuca nevadensis ssp. 2*			G5T1	S1
Moth	Carter's noctuid moth	*Photedes (Spartiniphaga) carterae*			G2G3	S2
Reptile	Spotted turtle	*Clemmys guttata*		**T**	G5	S3

Animal Type	Common name	*Scientific name*	Fed Status	State Status (ENSP)	Global Rarity Rank	State Rarity Rank
Reptile	Bog turtle	*Glyptemys (Clemmys) muhlenbergii*	**T**	**E**	G3	S1

SOURCE: Endangered Non-Game Species Program. T= Threatened; E = Endangered; SC = Special Concern

NJ Endangered and Nongame Species Program Special Concern Species Status Listing

Status Definitions:

Endangered: Applies to a species whose prospects for survival within the state are in immediate danger due to one or several factors, such as loss or degradation of habitat, over-exploitation, predation, competition, disease or environmental pollution, etc. An endangered species likely requires immediate action to avoid extinction within NJ.

Threatened: Applies to species that may become Endangered if conditions surrounding it begin to or continue to deteriorate. Thus, a Threatened species is one that is already vulnerable as a result of, for example, small population size, restricted range, narrow habitat affinities, significant population decline, etc.

Special Concern: Applies to species that warrant special attention because of inherent vulnerability to environmental deterioration or habitat modification that would result in its becoming threatened if conditions surrounding the species begin or continue to deteriorate. Factors that can lead to classification as special concern include, but are not limited to, species rarity in the State, highly specialized food and/or habitat requirements, low reproductive rate, isolated populations of the species within the State and/or other characteristics that make the species particularly susceptible to environmental or habitat changes. This category includes a species that meets the foregoing criteria and for which there is little understanding of its current population status in the state.

Stable: Applies to species that appear to be secure in NJ and not in danger of falling into any of the preceding the categories in the near future.

Undetermined: A species about which there is not enough information available to determine the status.

The lists of New Jersey's endangered and nongame wildlife species are maintained by the DEP's Division of Fish and Wildlife's Endangered and Nongame Species Program. These lists are used to determine protection and management actions necessary to ensure the survival of the state's endangered and nongame wildlife.

This work is made possible through voluntary contributions received through check-off donations to the Endangered Wildlife Conservation Fund on the New Jersey State Income Tax Form, the sale of Conserve Wildlife License Plates, and donations. For more information about the Endangered and Nongame Species Program or to report a sighting of endangered or threatened wildlife, contact the Endangered and Nongame Species, NJ Division of Fish and Wildlife, Mail Code 501-03, PO Box 420, Trenton, NJ 08625-0420.
2/21/2012

APPENDIX B

- **HABITAT CLASSIFICATION**
  - **Calcareous Fen**
  - **Calcareous Sinkhole Pond**
  - **Pine Barren Savanna**
    - Pine Barren Riverside Savanna
    - Pitch Pine Reedgrass Savanna
  - **Coastal Plain Intermittent Pond**

The habitat classification used in this report is based on the following documents:

Anderson, James R., Ernest E. Hardy, John T. Roach, and Richard E. Witmer. 1976. A Land Use and Land Cover Classification System for Use with Remote Sensor Data, U. S. Geological Survey Professional Paper 964, A revision of the land use classification system as presented in U.S. Geological Survey Circular 671. United States Department of the Interior, Washington, DC. 41 p.

Federal GeographicData Committee. 2008. National Vegetation Classification Standard, Version 2. FGDC Document number FGDC-STD-005-2008 (Version 2). http://usnvc.org/wp-content/uploads/2011/02/NVCS_V2_FINAL_2008-02.pdf

Gawler, S.C. 2008. Northeast terrestrial wildlife habitat classification: The Northeast habitat classification and mapping project: report to the Virginia Department of Game and Inland Fisheries on behalf of the Northeast Association of Fish and Wildlife Agencies for the National Fish and Wildlife Foundation (NFWF Project 2006-0181-003). NatureServe, Boston, MA.

New Jersey Department of Environmental Protection. 2010. NJDEP 2007 Land Use/Land Cover. http://www.state.nj.us/dep/gis/lulc07cshp.html

New Jersey Division of Fish and Wildlife. 2012. New Jersey Landscape Project, Version 3.1. New Jersey Department of Environmental Protection, Division of Fish and Wildlife, Endangered and Nongame Species Program. pp. 33. http://www.state.nj.us/dep/fgw/ensp/landscape/lp_report_3_1.pdf

United States National Vegetation Classification System (USNVC). 2012. The U.S. National Vegetation Classification System: Your guide to inventorying natural and cultural plant communities. http://usnvc.org/

Walz, K.S., K. Anderson, L. Kelly, A.Windisch, and M. Wong. 2012. Draft New Jersey ecological community crosswalk: A tool for the identification of habitats across jurisdictional boundaries. New Jersey Department of Environmental Protection, Division of Parks and Forestry, Office of Natural Lands Management, Natural Heritage Program, Trenton, NJ.

1. CALCAREOUS FEN CLASSIFICATION

NORTHEAST TERRESTRIAL WILDLIFE HABITAT/ECOLOGICAL SYSTEM:
North-Central Appalachian Seepage Fen
"This rare small-patch system occurs in scattered locations in the central Appalachians and eastern Great Lakes regions. Mostly non-forested, these open fens develop on shallow to deep peat over a sloping substrate, where seepage waters provide nutrients. Conditions are often circumneutral to alkaline. Sedges are the major dominants. Skunk cabbage is a characteristic forb. Some of these areas are kept open by grazing, and succession to shrublands may occur in the absence of disturbance." (Gawler 2008)

NATIONAL VEGETATION CLASSIFICATION SYSTEM (USNVC 2012):
Class: Shrubland & Grassland
Formation: Temperate & Boreal Bog & Fen
Division: North American Bog & Fen
MacroGroup: Appalachian, Interior Plateau & Prairie Fen
Group: North-Central Appalachian, Interior & Prairie Fen Group
NJ Associations / Ecological Community Types:
Calcareous Shrub Fen
Intermediate Graminoid Fen
Northern Piedmont Rich Fen
Pasture Fen
Prairie Fen
Rich Shrub Carr
Twig-rush Fen
Lakeshore Marl Fen *(note that this type of fen occurs on pond and lakeshores and is therefore included in the calcareous sinkhole pond classification below)*

LANDSCAPE MAP HABITAT CLASSIFICATION (NJDFW 2010)
Emergent Habitat
Forest Habitat
Wetland Habitat

LAND USE / LAND COVER TYPES (NJDEP 2010, NJDFW 2012)
Herbaceous Wetlands
Deciduous Scrub/Shrub Wetlands
Coniferous Scrub/Shrub Wetlands
Mixed Scrub/Shrub Wetlands (Deciduous Dominant)
Mixed Scrub/Shrub Wetlands (Coniferous Dominant)

2. CALCAREOUS SINKHOLE POND CLASSIFICATION

NORTHEAST TERRESTRIAL WILDLIFE HABITAT/ECOLOGICAL SYSTEM:
Central Interior Highlands and Appalachian Sinkhole and Depression Pond

"This system of ponds and wetlands ranges from the Ozarks east to the northern Piedmont of Pennsylvania and New Jersey. It is found in basins of sinkholes or other isolated depressions on uplands. Soils are very poorly drained, and surface water may be present for extended periods of time, rarely becoming dry. Water depth may vary greatly on a seasonal basis and may be a meter deep or more in the winter. Some examples become dry in the summer. Soils may be deep (1 m or more), consisting of peat or muck, with parent material of peat, muck or alluvium. Ponds vary from open water to herb-, shrub-, or tree-dominated. Tree-dominated examples typically contain oaks, sycamore, green ash, silver maple, and/or black gum. Buttonbush is a typical shrub component." (Gawler, 2008)

NATIONAL VEGETATION CLASSIFICATION SYSTEM (USNVC 2012):
Class: Shrubland & Grassland
Formation: Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland
Division: Eastern North American Freshwater Wet Meadow, Riparian & Marsh
MacroGroup: Eastern North American Wet Meadow & Marsh
Group: Eastern North American Wet Meadow Group
NJ Associations / Ecological Community Types:
Calcareous Sinkhole Boltonia Pondshore
Calcareous Sinkhole Mote Marsh

NATIONAL VEGETATION CLASSIFICATION SYSTEM (USNVC 2012):
Class: Shrubland & Grassland
Formation: Temperate & Boreal Bog & Fen
Division: North American Bog & Fen
MacroGroup: Appalachian, Interior Plateau & Prairie Fen
Group: North-Central Appalachian, Interior & Prairie Fen
NJ Associations / Ecological Community Types:
Lakeshore Marl Fen *(note that this is a calcareous fen that occurs on pond and lakeshores and is therefore included in the calcareous sinkhole pond classification section)*

NATIONAL VEGETATION CLASSIFICATION SYSTEM (USNVC 2012):
Class: Forest to Open Woodland
Formation: Temperate Flooded & Swamp Forest
Division: Eastern North American Flooded & Swamp Forest
MacroGroup: Northern & Central Floodplain Forest & Scrub
Group: Silver Maple - Green Ash - Sycamore - Hackberry Floodplain Forest
NJ Associations / Ecological Community Types:
Sinkhole Pond Floodplain Forest
Pond or Lakeside Ash - Maple Swamp
Northeastern Maple - Ash Swamp

LANDSCAPE MAP HABITAT CLASSIFICATION (NJDFW 2010)
Forest Habitat
Wetland Habitat
Vernal Habitat

LAND USE / LAND COVER TYPES (NJDEP 2010, NJDFW 2012)

Herbaceous Wetlands
Deciduous Wooded Wetlands
Mixed Forested Wetlands (Deciduous Dominant)

3. PINE BARREN SAVANNA CLASSIFICATION

NORTHEAST TERRESTRIAL WILDLIFE HABITAT/ECOLOGICAL SYSTEM:
Northern Atlantic Coastal Plain Stream and River

"This system is found throughout the northern Atlantic Coastal Plain from Virginia to New Jersey along low-gradient small streams and rivers with little to moderate floodplain development. This system is influenced by overbank flooding, groundwater seepage and occasional beaver impoundments. The vegetation is a mosaic of forests, woodlands, shrublands, and herbaceous communities. Canopy composition and cover can vary within examples of this system, but typical tree species may include bottomland oaks, Atlantic white cedar, red maple, green ash, black gum, black birch, sweetgum, and sycamore. Shrubs and herbaceous layers can vary in richness and cover. Some characteristic shrubs include alder, musclewood, and spicebush. Seepage forests dominated by red maple sweet bay can often be found within this system, especially at the headwaters and terraces of streams." (Gawler, 2008)

NATIONAL VEGETATION CLASSIFICATION SYSTEM (USNVC 2012):

Class: Forest to Open Woodland
Formation: Temperate Flooded & Swamp Forest
Division: Eastern North American Flooded & Swamp Forest
MacroGroup: Northern & Central Swamp Forest
Group: Northern Atlantic White-cedar-(Pitch Pine) Swamp Group

NJ Associations / Ecological Community Types:

Pine Barren Riverside Bog Asphodel Savanna
Pine Barren Riverside Muhly Savanna
Pine Barren Riverside Sedge Savanna
Pine Barren Riverside Shrub Savanna
Pine Barren Riverside Wet Depression Savanna

NORTHEAST TERRESTRIAL WILDLIFE HABITAT/ECOLOGICAL SYSTEM:
Northern Atlantic Coastal Plain Pitch Pine Lowland

"This system is comprised of wetland pine barrens, best developed in the New Jersey Pine Barrens. Although it can be extensive, components often co-occur as a mosaic with upland pine barrens vegetation as well. Substrates range from saturated deep peats to seasonally saturated mineral soils. The range of hydroperiods is reflected in the vegetation, which ranges from wet grasslands dominated by pine barren sandreed to seasonally saturated pine forests. Fire frequency also has a profound influence on the vegetation. Where fire frequency is high, woody vegetation is impeded, favoring the development of large wet grasslands." (Gawler, 2008)

NATIONAL VEGETATION CLASSIFICATION SYSTEM (USNVC 2012):
Class: Forest to Open Woodland
Formation: Temperate Flooded & Swamp Forest
Division: Eastern North American Flooded & Swamp Forest
MacroGroup: Northern Swamp Forest
Group: Northern Atlantic Coastal Conifer Swamp
NJ Associations / Ecological Community Types:
Pitch Pine / Sandreed Savanna

LANDSCAPE MAP HABITAT CLASSIFICATION (NJDFW 2010)
Emergent Habitat
Forest Habitat
Wetland Habitat

LAND USE / LAND COVER TYPES (NJDEP 2010, NJDFW 2012)
Herbaceous Wetlands
Coniferous Scrub/Shrub Wetlands
Mixed Scrub/Shrub Wetlands (Coniferous Dominant)
Coniferous Wooded Wetlands

4. COASTAL PLAIN INTERMITTENT POND CLASSIFICATION

NORTHEAST TERRESTRIAL WILDLIFE HABITAT/ECOLOGICAL SYSTEM:
Northern Atlantic Coastal Plain Pond
'This system includes groundwater-flooded depressions characterized by a flora characteristic of the coastal plain from the Delmarva Peninsula to Cape Cod. It occurs on sandy deposits such as outwash plains of the glaciated region (Long Island and Cape Cod), on the deep sands of the New Jersey Pine Barrens, or on finer sediments of the Coastal Plain of Cape May, the Delmarva peninsula, and the Chesapeake Bay region. Ponds may contain permanent water, such as the deep glacial kettleholes of Cape Cod and Long Island, or may be shallow basins where groundwater drops below the surface late in the growing season. The vegetation is characterized by strong zonation, with a border of tall shrubs, such as highbush blueberry, and several essentially concentric bands dominated by progressively lower vegetation with strong coastal plain affinities. In shallower basins, such strong zonation is generally lacking but still remains evident in some cases. On Cape Cod, Long Island, and New Jersey, this system most often occurs within the pitch pine barrens. From Cape May and south, it occurs within an upland matrix of mixed hardwood forests and generally supports a seasonally flooded swamp forest characterized by sweet gum, red maple, and wetland oaks such as willow oak. Buttonbush often occurs as scattered individuals or forms a shrub swamp in areas with lower diversity and cover of coastal plain flora. (Gawler, 2008)

NATIONAL VEGETATION CLASSIFICATION SYSTEM (USNVC 2012):

Class: Shrubland & Grassland
Formation: Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland
Division: Eastern North American Freshwater Wet Meadow, Riparian & Marsh
MacroGroup: Atlantic & Gulf Coastal Plain Pondshore and Wet Meadow
Group: Atlantic & Gulf Coastal Plain Pondshore & Wet Prairie Group

NJ Associations / Ecological Community Types:

Bulblet Flatsedge Coastal Plain Sandy Pondshore
Buttonbush Coastal Plain Pond
Cape May - Delmarva Depression Meadow
Coastal Plain Horsetail Spikerush Peatland
Coastal Plain Muck Pondshore
Coastal Plain Pondshore
Deep Muck Coastal Plain Pond
Delmarva Bay Tall Grassland
Northern Peatland Sedge Coastal Plain Pond
Panicgrass Pondshore
Swamp-loosestrife Coastal Plain Pond

LANDSCAPE MAP HABITAT CLASSIFICATION (NJDFW 2010)

Emergent Habitat
Wetland Habitat
Vernal Habitat

LAND USE / LAND COVER TYPES (NJDEP 2010, NJDFW 2012)

Herbaceous Wetlands

Appendix C

CMP THREATS AND STRESSES Tables for State Endangered Plant Species and Wildlife SGCN

- ✧ Calcareous Fen Habitat
  - o State Endangered Plant Species
  - o Wildlife SGCN
- ✧ Calcareous Sinkhole Pond Habitat
  - o State Endangered Plant Species
  - o Wildlife SGCN
- ✧ Pine Barren Savanna Habitat
  - o State Endangered Plant Species
  - o Wildlife SGCN
- ✧ Coastal Plain Intermittent Pond Habitat
  - o State Endangered Plant Species
  - o Wildlife SGCN

CMP THREATS & STRESSES TO STATE ENDANGERED PLANT SPECIES IN CALCAREOUS FEN HABITAT		Bog Rosemary	Rush Aster	Foxtail Sedge	Water Sedge	Lesser Panicled Sedge	Handsome Sedge	Cyperus-like Sedge	Wood's Sedge	Marsh Cinquefoil	Hemlock-parsley	Small White Lady's-	Showy Lady's-slipper	Few-flower Spike-rush	Variegated Horsetail	Queen-of-the-prairie	Labrador Marsh	Small Bedstraw	Northern Panic Grass	Capillary Beaked-rush	Orange Coneflower	Shining Willow	Bog Willow	Strict Blue-eyed Grass	Arborvitae	Seaside Arrow-grass	Spreading Globe Flower	Sessile Water-speedwell
		Andromeda glaucophylla	*Aster borealis*	*Carex alopecoidea*	*Carex aquatilis*	*Carex diandra*	*Carex formosa*	*Carex pseudocyperus*	*Carex woodii*	*Comarum palustris*	*Coniioselinum chinense*	*Cypripedium candidum*	*Cypripedium reginae*	*Eleocharis quinquefolia*	*Equisetum variegatum*	*Filipendula rubra*	*Galium labradoricum*	*Galium trifidum*	*Panicum boreale*	*Rhynchospora capillacea*	*Rudbeckia fulgida*	*Salix lucida ssp. lucida*	*Salix pedicellaris*	*Sisyrinchium montanum*	*Thuja occidentalis*	*Triglochin maritima*	*Trollius laxus ssp. laxus*	*Veronica catenata*
CMP THREATS																												
1	**Residential and Commercial Development**																											
1.1	Housing and Urban Areas	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y
1.2	Commercial and Industrial Areas	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y
1.3	Tourism and Recreation Areas																			Y								
2	**Agriculture and Aquaculture**																											
2.1	Annual and Perennial Non-timber Crops	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
2.2	Wood and Pulp Plantations																											

CMP THREATS & STRESSES TO STATE ENDANGERED PLANT SPECIES IN CALCAREOUS FEN HABITAT		Bog Rosemary	Rush Aster	Foxtail Sedge	Water Sedge	Lesser Panicled Sedge	Handsome Sedge	Cyperus-like Sedge	Wood's Sedge	Marsh Cinquefoil	Hemlock-parsley	Small White Lady's-	Showy Lady's-slipper	Few-flower Spike-rush	Variegated Horsetail	Queen-of-the-prairie	Labrador Marsh	Small Bedstraw	Northern Panic Grass	Capillary Beaked-rush	Orange Coneflower	Shining Willow	Bog Willow	Strict Blue-eyed Grass	Arborvitae	Seaside Arrow-grass	Spreading Globe Flower	Sessile Water-speedwell
		Andromeda glaucophylla	*Aster borealis*	*Carex alopecoidea*	*Carex aquatilis*	*Carex diandra*	*Carex formosa*	*Carex pseudocyperus*	*Carex woodii*	*Comarum palustris*	*Conioselinum chinense*	*Cypripedium candidum*	*Cypripedium reginae*	*Eleocharis quinquefolia*	*Equisetum variegatum*	*Filipendula rubra*	*Galium labradoricum*	*Galium trifidum*	*Panicum boreale*	*Rhynchospora capillacea*	*Rudbeckia fulgida*	*Salix lucida ssp. lucida*	*Salix pedicellaris*	*Sisyrinchium montanum*	*Thuja occidentalis*	*Triglochin maritima*	*Trollius laxus ssp. laxus*	*Veronica catenata*
2.3	Livestock Farming and Ranching	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y
2.4	Marine and Freshwater Aquaculture																											
3	**Energy production and mining**																											
3.1	Oil and Gas Drilling																											
3.2	Mining and Quarrying																											
3.3	Renewable Energy																											
4	**Transportation and service corridors**																											
4.1	Roads and Railroads	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y
4.2	Utility and Service Lines	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4.3	Shipping Lanes																											

CMP THREATS & STRESSES TO STATE ENDANGERED PLANT SPECIES IN CALCAREOUS FEN HABITAT		Bog Rosemary	Rush Aster	Foxtail Sedge	Water Sedge	Lesser Panicled Sedge	Handsome Sedge	Cyperus-like Sedge	Wood's Sedge	Marsh Cinquefoil	Hemlock-parsley	Small White Lady's-	Showy Lady's-slipper	Few-flower Spike-rush	Variegated Horsetail	Queen-of-the-prairie	Labrador Marsh	Small Bedstraw	Northern Panic Grass	Capillary Beaked-rush	Orange Coneflower	Shining Willow	Bog Willow	Strict Blue-eyed Grass	Arborvitae	Seaside Arrow-grass	Spreading Globe Flower	Sessile Water-speedwell
		Andromeda glaucophylla	*Aster borealis*	*Carex alopecoidea*	*Carex aquatilis*	*Carex diandra*	*Carex formosa*	*Carex pseudocyperus*	*Carex woodii*	*Comarum palustris*	*Conioselinum chinense*	*Cypripedium candidum*	*Cypripedium reginae*	*Eleocharis quinquefolia*	*Equisetum variegatum*	*Filipendula rubra*	*Galium labradoricum*	*Galium trifidum*	*Panicum boreale*	*Rhynchospora capillacea*	*Rudbeckia fulgida*	*Salix lucida ssp. lucida*	*Salix pedicellaris*	*Sisyrinchium montanum*	*Thuja occidentalis*	*Triglochin maritima*	*Trollius laxus ssp. laxus*	*Veronica catenata*
4.4	Flight Paths																											
5	**Biological Resource Use**																											
5.1	Hunting and Collecting Terrestrial Animals	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5.2	Gathering Terrestrial Plants	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5.3	Logging and Wood Harvesting																											
5.4	Fishing and Harvesting Aquatic Resources																											
6	**Human Intrusions and Disturbance**																											
6.1	Recreational Activities	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
6.2	War, Civil Unrest and Military Exercises																											
6.3	Work and Other Activities	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

CMP THREATS & STRESSES TO STATE ENDANGERED PLANT SPECIES IN CALCAREOUS FEN HABITAT		Bog Rosemary	Rush Aster	Foxtail Sedge	Water Sedge	Lesser Panicled Sedge	Handsome Sedge	Cyperus-like Sedge	Wood's Sedge	Marsh Cinquefoil	Hemlock-parsley	Small White Lady's-	Showy Lady's-slipper	Few-flower Spike-rush	Variegated Horsetail	Queen-of-the-prairie	Labrador Marsh	Small Bedstraw	Northern Panic Grass	Capillary Beaked-rush	Orange Coneflower	Shining Willow	Bog Willow	Strict Blue-eyed Grass	Arborvitae	Seaside Arrow-grass	Spreading Globe Flower	Sessile Water-speedwell
		Andromeda glaucophylla	*Aster borealis*	*Carex alopecoidea*	*Carex aquatilis*	*Carex diandra*	*Carex formosa*	*Carex pseudocyperus*	*Carex woodii*	*Comarum palustris*	*Conioselinum chinense*	*Cypripedium candidum*	*Cypripedium reginae*	*Eleocharis quinquefolia*	*Equisetum variegatum*	*Filipendula rubra*	*Galium labradoricum*	*Galium trifidum*	*Panicum boreale*	*Rhynchospora capillacea*	*Rudbeckia fulgida*	*Salix lucida ssp. lucida*	*Salix pedicellaris*	*Sisyrinchium montanum*	*Thuja occidentalis*	*Triglochin maritima*	*Trollius laxus ssp. laxus*	*Veronica catenata*
7	**Natural System Modifications**																											
7.1	Fire and Fire Suppression																											
7.2	Dams and Water Management/Use	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
7.3	Other Ecosystem Modifications																											
8	**Invasive and other problematic species and genes**																											
8.1	Invasive Non-native/Alien species	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y
8.2	Problematic Native Species	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
8.3	Introduced Genetic Material																											
9	**Pollution**																											

CMP THREATS & STRESSES TO STATE ENDANGERED PLANT SPECIES IN CALCAREOUS FEN HABITAT		Bog Rosemary	Rush Aster	Foxtail Sedge	Water Sedge	Lesser Panicled Sedge	Handsome Sedge	Cyperus-like Sedge	Wood's Sedge	Marsh Cinquefoil	Hemlock-parsley	Small White Lady's-	Showy Lady's-slipper	Few-flower Spike-rush	Variegated Horsetail	Queen-of-the-prairie	Labrador Marsh	Small Bedstraw	Northern Panic Grass	Capillary Beaked-rush	Orange Coneflower	Shining Willow	Bog Willow	Strict Blue-eyed Grass	Arborvitae	Seaside Arrow-grass	Spreading Globe Flower	Sessile Water-speedwell
		Andromeda glaucophylla	*Aster borealis*	*Carex alopecoidea*	*Carex aquatilis*	*Carex diandra*	*Carex formosa*	*Carex pseudocyperus*	*Carex woodii*	*Comarum palustris*	*Conioselinum chinense*	*Cypripedium candidum*	*Cypripedium reginae*	*Eleocharis quinquefolia*	*Equisetum variegatum*	*Filipendula rubra*	*Galium labradoricum*	*Galium trifidum*	*Panicum boreale*	*Rhynchospora capillacea*	*Rudbeckia fulgida*	*Salix lucida ssp. lucida*	*Salix pedicellaris*	*Sisyrinchium montanum*	*Thuja occidentalis*	*Triglochin maritima*	*Trollius laxus ssp. laxus*	*Veronica catenata*
9.1	Household Sewage and Urban Waste Water	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y
9.2	Industrial and Military Effluents	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
9.3	Agricultural and Forestry Effluents	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y
9.4	Garbage and Solid Waste	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
9.5	Airborne Pollutants																											
9.6	Excess Energy																											
10	**Geological Events**																											
10.1	Volcanoes																											
10.2	Earthquakes/Tsunamis																											
10.3	Avalanches/Landslides																											

CMP THREATS & STRESSES TO STATE ENDANGERED PLANT SPECIES IN CALCAREOUS FEN HABITAT		Bog Rosemary	Rush Aster	Foxtail Sedge	Water Sedge	Lesser Panicled Sedge	Handsome Sedge	Cyperus-like Sedge	Wood's Sedge	Marsh Cinquefoil	Hemlock-parsley	Small White Lady's-	Showy Lady's-slipper	Few-flower Spike-rush	Variegated Horsetail	Queen-of-the-prairie	Labrador Marsh	Small Bedstraw	Northern Panic Grass	Capillary Beaked-rush	Orange Coneflower	Shining Willow	Bog Willow	Strict Blue-eyed Grass	Arborvitae	Seaside Arrow-grass	Spreading Globe Flower	Sessile Water-sneedwell
		Andromeda glaucophylla	*Aster borealis*	*Carex alopecoidea*	*Carex aquatilis*	*Carex diandra*	*Carex formosa*	*Carex pseudocyperus*	*Carex woodii*	*Comarum palustris*	*Conioselinum chinense*	*Cypripedium candidum*	*Cypripedium reginae*	*Eleocharis quinquefolia*	*Equisetum variegatum*	*Filipendula rubra*	*Galium labradoricum*	*Galium trifidum*	*Panicum boreale*	*Rhynchospora capillacea*	*Rudbeckia fulgida*	*Salix lucida ssp. lucida*	*Salix pedicellaris*	*Sisyrinchium montanum*	*Thuja occidentalis*	*Triglochin maritima*	*Trollius laxus ssp. laxus*	*Veronica catenata*
11	**Climage Change and Severe Weather**																											
11.1	Habitat Shifting and Alteration	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
11.2	Droughts	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
11.3	Temperature Extremes																											
11.4	Storms and Flooding	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
11.5	*Phenology and Pollination/Pollinators*	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
CMP STRESSES																												
1	**Ecosystem/Community Stresses**																											
1.1	Ecosystem Conversion	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

CMP THREATS & STRESSES TO STATE ENDANGERED PLANT SPECIES IN CALCAREOUS FEN HABITAT		Bog Rosemary	Rush Aster	Foxtail Sedge	Water Sedge	Lesser Panicled Sedge	Handsome Sedge	Cyperus-like Sedge	Wood's Sedge	Marsh Cinquefoil	Hemlock-parsley	Small White Lady's-	Showy Lady's-slipper	Few-flower Spike-rush	Variegated Horsetail	Queen-of-the-prairie	Labrador Marsh	Small Bedstraw	Northern Panic Grass	Capillary Beaked-rush	Orange Coneflower	Shining Willow	Bog Willow	Strict Blue-eyed Grass	Arborvitae	Seaside Arrow-grass	Spreading Globe Flower	Sessile Water-speedwell
		Andromeda glaucophylla	*Aster borealis*	*Carex alopecoidea*	*Carex aquatilis*	*Carex diandra*	*Carex formosa*	*Carex pseudocyperus*	*Carex woodii*	*Comarum palustris*	*Conioselinum chinense*	*Cypripedium candidum*	*Cypripedium reginae*	*Eleocharis quinquefolia*	*Equisetum variegatum*	*Filipendula rubra*	*Galium labradoricum*	*Galium trifidum*	*Panicum boreale*	*Rhynchospora capillacea*	*Rudbeckia fulgida*	*Salix lucida ssp. lucida*	*Salix pedicellaris*	*Sisyrinchium montanum*	*Thuja occidentalis*	*Triglochin maritima*	*Trollius laxus ssp. laxus*	*Veronica catenata*
1.2	Ecosystem Degradation	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
1.3	Indirect Ecosystem Effects																											
2	**Species stresses**																											
2.1	Species mortality	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
2.2	Species disturbance																											
2.3	Indirect species effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

CMP THREATS & STRESSES TO WILDLIFE SGCN IN CALCAREOUS FEN HABITAT		Silver-bordered Fritillary	Canada warbler	Veery	Sedge Wren	Spotted turtle	Black-billed cuckoo	Least flycatcher	Bog turtle	Schweitzer's buckmoth	Red-headed woodpecker	Mitchell's Satyr (extirpated)	American woodcock	Northern parula	Kennedy's Emerald	Brush-tipped Emerald	Winter wren	Golden-winged warbler
		Boloria selene myrina	*Cardellina canadensis*	*Catharus fuscescens*	*Cistothorus platensis*	*Clemmys guttata*	*Coccyzus erythropthalmus*	*Empidonax minimus*	*Glyptemys muhlenbergii*	*Hemileuca nevadensis ssp. 2*	*Melanerpes erythrocephalus*	*Neonympha mitchellii*	*Scolopax minor*	*Setophaga americana*	*Somatochlora kennedyi*	*Somatochlora walshii*	*Troglodytes hiemalis*	*Vermivora chrysoptera*
CMP THREATS																		
1	**Residential and Commercial Development**																	
1.1	Housing and Urban Areas	?	Y	Y	Y	Y	Y	Y	Y	?	Y	?	Y	Y	Y	Y	Y	Y
1.2	Commercial and Industrial Areas	?	Y	Y	Y	Y	Y	Y	Y	?	Y	?	Y	Y	Y	Y	Y	Y
1.3	Tourism and Recreation Areas	Y				Y			Y									
2	**Agriculture and Aquaculture**																	
2.1	Annual and Perennial Non-timber Crops	y				Y			Y						Y	Y		
2.2	Wood and Pulp Plantations					N												
2.3	Livestock Farming and Ranching	?				Y			Y	?		?			Y	Y		
2.4	Marine and Freshwater Aquaculture																	
3	**Energy production and mining**																	
3.1	Oil and Gas Drilling					Y			Y						Y	Y		

	CMP THREATS & STRESSES TO WILDLIFE SGCN IN CALCAREOUS FEN HABITAT	Silver-bordered Fritillary	Canada warbler	Veery	Sedge Wren	Spotted turtle	Black-billed cuckoo	Least flycatcher	Bog turtle	Schweitzer's buckmoth	Red-headed woodpecker	Mitchell's Satyr (extirpated)	American woodcock	Northern parula	Kennedy's Emerald	Brush-tipped Emerald	Winter wren	Golden-winged warbler
		Boloria selene myrina	*Cardellina canadensis*	*Catharus fuscescens*	*Cistothorus platensis*	*Clemmys guttata*	*Coccyzus erythropthalmus*	*Empidonax minimus*	*Glyptemys muhlenbergii*	*Hemileuca nevadensis ssp. 2*	*Melanerpes erythrocephalus*	*Neonympha mitchellii*	*Scolopax minor*	*Setophaga americana*	*Somatochlora kennedyi*	*Somatochlora walshii*	*Troglodytes hiemalis*	*Vermivora chrysoptera*
3.2	Mining and Quarrying	?				Y			Y	?		?			Y	Y		
3.3	Renewable Energy	?	Y	Y	Y	Y	Y	Y	Y	?	Y	?	Y	Y	Y	Y	Y	Y
4	**Transportation and service corridors**																	
4.1	Roads and Railroads	y	Y	Y	Y	Y	Y	Y	Y	y	Y	Y	Y	Y	Y	Y	Y	Y
4.2	Utility and Service Lines	?	Y	Y	Y	Y	Y	Y	Y	?	Y	?	Y	Y	Y	Y	Y	Y
4.3	Shipping Lanes																	
4.4	Flight Paths																	
5	**Biological Resource Use**																	
5.1	Hunting and Collecting Terrestrial Animals					Y			Y	?		y			Y	Y		
5.2	Gathering Terrestrial Plants																	
5.3	Logging and Wood Harvesting		Y	Y		Y	Y	Y			Y			Y	Y	Y	Y	Y

CMP THREATS & STRESSES TO <u>WILDLIFE SGCN IN</u> <u>CALCAREOUS FEN HABITAT</u>		Silver-bordered Fritillary	Canada warbler	Veery	Sedge Wren	Spotted turtle	Black-billed cuckoo	Least flycatcher	Bog turtle	Schweitzer's buckmoth	Red-headed woodpecker	Mitchell's Satyr (extirpated)	American woodcock	Northern parula	Kennedy's Emerald	Brush-tipped Emerald	Winter wren	Golden-winged warbler
		Boloria selene myrina	*Cardellina canadensis*	*Catharus fuscescens*	*Cistothorus platensis*	*Clemmys guttata*	*Coccyzus erythropthalmus*	*Empidonax minimus*	*Glyptemys muhlenbergii*	*Hemileuca nevadensis ssp. 2*	*Melanerpes erythrocephalus*	*Neonympha mitchellii*	*Scolopax minor*	*Setophaga americana*	*Somatochlora kennedyi*	*Somatochlora walshii*	*Troglodytes hiemalis*	*Vermivora chrysoptera*
5.4	Fishing and Harvesting Aquatic Resources																	
6	**Human Intrusions and Disturbance**																	
6.1	Recreational Activities	Y				Y			Y						Y	Y		
6.2	War, Civil Unrest and Military Exercises					Y			Y						Y	Y		
6.3	Work and Other Activities	y				Y			Y	y		y			Y	Y		
7	**Natural System Modifications**																	
7.1	Fire and Fire Suppression		Y	Y		Y	Y	Y	Y		Y			Y			Y	Y
7.2	Dams and Water Management/Use	y		Y		Y			Y	y		y			Y	Y		Y
7.3	Other Ecosystem Modifications					Y			Y									
8	**Invasive and other problematic species and genes**																	
8.1	Invasive Non-native/Alien species	y	Y	Y		Y	Y	Y	Y	y	Y	y		Y	Y	Y	Y	Y

	CMP THREATS & STRESSES TO WILDLIFE SGCN IN CALCAREOUS FEN HABITAT	Silver-bordered Fritillary	Canada warbler	Veery	Sedge Wren	Spotted turtle	Black-billed cuckoo	Least flycatcher	Bog turtle	Schweitzer's buckmoth	Red-headed woodpecker	Mitchell's Satyr (extirpated)	American woodcock	Northern parula	Kennedy's Emerald	Brush-tipped Emerald	Winter wren	Golden-winged warbler
		Boloria selene myrina	*Cardellina canadensis*	*Catharus fuscescens*	*Cistothorus platensis*	*Clemmys guttata*	*Coccyzus erythropthalmus*	*Empidonax minimus*	*Glyptemys muhlenbergii*	*Hemileuca nevadensis ssp. 2*	*Melanerpes erythrocephalus*	*Neonympha mitchellii*	*Scolopax minor*	*Setophaga americana*	*Somatochlora kennedyi*	*Somatochlora walshii*	*Troglodytes hiemalis*	*Vermivora chrysoptera*
8.2	Problematic Native Species		Y	Y		Y	Y	Y	Y	y	Y			Y	Y	Y	Y	Y
8.3	Introduced Genetic Material														Y	Y		Y
9	**Pollution**																	
9.1	Household Sewage and Urban Waste Water					Y			Y						Y	Y		
9.2	Industrial and Military Effluents					Y			Y						Y	Y		
9.3	Agricultural and Forestry Effluents					Y		Y	Y		Y	y			Y	Y		
9.4	Garbage and Solid Waste					Y			Y						Y	Y		
9.5	Airborne Pollutants		Y	Y			Y	Y			Y			Y	Y	Y	Y	Y
9.6	Excess Energy																	
10	**Geological Events**																	
10.1	Volcanoes					Y			Y									

CMP THREATS & STRESSES TO WILDLIFE SGCN IN CALCAREOUS FEN HABITAT		Silver-bordered Fritillary	Canada warbler	Veery	Sedge Wren	Spotted turtle	Black-billed cuckoo	Least flycatcher	Bog turtle	Schweitzer's buckmoth	Red-headed woodpecker	Mitchell's Satyr (extirpated)	American woodcock	Northern parula	Kennedy's Emerald	Brush-tipped Emerald	Winter wren	Golden-winged warbler
		Boloria selene myrina	*Cardellina canadensis*	*Catharus fuscescens*	*Cistothorus platensis*	*Clemmys guttata*	*Coccyzus erythropthalmus*	*Empidonax minimus*	*Glyptemys muhlenbergii*	*Hemileuca nevadensis ssp. 2*	*Melanerpes erythrocephalus*	*Neonympha mitchellii*	*Scolopax minor*	*Setophaga americana*	*Somatochlora kennedyi*	*Somatochlora walshii*	*Troglodytes hiemalis*	*Vermivora chrysoptera*
10.2	Earthquakes/Tsunamis					Y			Y									
10.3	Avalanches/Landslides					Y			Y									
11	**Climage Change and Severe Weather**																	
11.1	Habitat Shifting and Alteration	Y	Y	Y		Y	Y	Y	Y	y	Y	Y		Y	Y	Y	Y	Y
11.2	Droughts		Y	Y		Y	Y	Y	Y		Y			Y	Y	Y	Y	Y
11.3	Temperature Extremes		Y	Y		Y	Y	Y	Y		Y			Y	Y	Y	Y	Y
11.4	Storms and Flooding	Y	Y	Y		Y	Y	Y	Y	Y		Y		Y	Y	Y		Y
11.5	*Phenology and Pollination/Pollinators*																	

CMP STRESSES																		
1	**Ecosystem/Community Stresses**																	
1.1	Ecosystem Conversion					Y			Y						Y	Y		

	CMP THREATS & STRESSES TO <u>WILDLIFE SGCN IN</u> <u>CALCAREOUS FEN HABITAT</u>	Silver-bordered Fritillary	Canada warbler	Veery	Sedge Wren	Spotted turtle	Black-billed cuckoo	Least flycatcher	Bog turtle	Schweitzer's buckmoth	Red-headed woodpecker	Mitchell's Satyr (extirpated)	American woodcock	Northern parula	Kennedy's Emerald	Brush-tipped Emerald	Winter wren	Golden-winged warbler
		Boloria selene myrina	*Cardellina canadensis*	*Catharus fuscescens*	*Cistothorus platensis*	*Clemmys guttata*	*Coccyzus erythropthalmus*	*Empidonax minimus*	*Glyptemys muhlenbergii*	*Hemileuca nevadensis ssp. 2*	*Melanerpes erythrocephalus*	*Neonympha mitchellii*	*Scolopax minor*	*Setophaga americana*	*Somatochlora kennedyi*	*Somatochlora walshii*	*Troglodytes hiemalis*	*Vermivora chrysoptera*
1.2	Ecosystem Degradation					Y			Y						Y	Y		
1.3	Indirect Ecosystem Effects					Y			Y						Y	Y		
2	**Species stresses**																	
2.1	Species mortality					Y			Y						Y	Y		
	2.1.1 Herbicide Application to Phragmites australis or Goats Eating Herbaceous Species While Controlling Rosa multiflora					Y			Y									
2.2	Species disturbance					Y			Y						Y	Y		
2.3	Indirect species effects					Y			Y						Y	Y		

CMP THREATS & STRESSES TO STATE ENDANGERED PLANT SPECIES IN CALCAREOUS SINKHOLE POND HABITAT		Large Water-plantain	Appalachian Mountain Boltonia	Cloud Sedge	Hop-like Sedge	Small Floating Manna Grass	Larger Canadian St. John's Wort	Water-marigold	Lake Water-cress	Wiry Panic Grass	Arum-leaf Arrowhead	Torrey's Bulrush	Small Burr-reed	Lesser Bladderwort
		Alisma triviale	*Boltonia montana*	*Carex haydenii*	*Carex lupuliformis*	*Glyceria borealis*	*Hypericum majus*	*Megalodonta beckii*	*Neobeckia lacustris*	*Panicum flexile*	*Sagittaria cuneata*	*Schoenoplectus torreyi*	*Sparganium natans*	*Utricularia minor*
THREATS														
1	**Residential and Commercial Development**													
1.1	Housing and Urban Areas	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
1.2	Commercial and Industrial Areas	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
1.3	Tourism and Recreation Areas	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
2	**Agriculture and Aquaculture**													
2.1	Annual and Perennial Non-timber Crops	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
2.2	Wood and Pulp Plantations													
2.3	Livestock Farming and Ranching	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
2.4	Marine and Freshwater Aquaculture													
3	**Energy production and mining**													
3.1	Oil and Gas Drilling													
3.2	Mining and Quarrying	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

CMP THREATS & STRESSES TO STATE ENDANGERED PLANT SPECIES IN CALCAREOUS SINKHOLE POND HABITAT		Large Water-plantain	Appalachian Mountain Boltonia	Cloud Sedge	Hop-like Sedge	Small Floating Manna Grass	Larger Canadian St. John's Wort	Water-marigold	Lake Water-cress	Wiry Panic Grass	Arum-leaf Arrowhead	Torrey's Bulrush	Small Burr-reed	Lesser Bladderwort
		Alisma triviale	*Boltonia montana*	*Carex haydenii*	*Carex lupuliformis*	*Glyceria borealis*	*Hypericum majus*	*Megalodonta beckii*	*Neobeckia lacustris*	*Panicum flexile*	*Sagittaria cuneata*	*Schoenoplectus torreyi*	*Sparganium natans*	*Utricularia minor*
3.3	Renewable Energy													
4	**Transportation and service corridors**													
4.1	Roads and Railroads	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4.2	Utility and Service Lines	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4.3	Shipping Lanes													
4.4	Flight Paths													
5	**Biological Resource Use**													
5.1	Hunting and Collecting Terrestrial Animals													
5.2	Gathering Terrestrial Plants													
5.3	Logging and Wood Harvesting	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5.4	Fishing and Harvesting Aquatic Resources													
6	**Human Intrusions and Disturbance**													
6.1	Recreational Activities	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
6.2	War, Civil Unrest and Military Exercises													

CMP THREATS & STRESSES TO STATE ENDANGERED PLANT SPECIES IN CALCAREOUS SINKHOLE POND HABITAT		Large Water-plantain	Appalachian Mountain Boltonia	Cloud Sedge	Hop-like Sedge	Small Floating Manna Grass	Larger Canadian St. John's Wort	Water-marigold	Lake Water-cress	Wiry Panic Grass	Arum-leaf Arrowhead	Torrey's Bulrush	Small Burr-reed	Lesser Bladderwort
		Alisma triviale	*Boltonia montana*	*Carex haydenii*	*Carex lupuliformis*	*Glyceria borealis*	*Hypericum majus*	*Megalodonta beckii*	*Neobeckia lacustris*	*Panicum flexile*	*Sagittaria cuneata*	*Schoenoplectus torreyi*	*Sparganium natans*	*Utricularia minor*
6.3	Work and Other Activities	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
7	**Natural System Modifications**													
7.1	Fire and Fire Suppression													
7.2	Dams and Water Management/Use	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
7.3	Other Ecosystem Modifications	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
8	**Invasive and other problematic species and genes**													
8.1	Invasive Non-native/Alien species	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
8.2	Problematic Native Species	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
8.3	Introduced Genetic Material													
9	**Pollution**													
9.1	Household Sewage and Urban Waste Water	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
9.2	Industrial and Military Effluents													
9.3	Agricultural and Forestry Effluents	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
9.4	Garbage and Solid Waste	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

CMP THREATS & STRESSES TO STATE ENDANGERED PLANT SPECIES IN CALCAREOUS SINKHOLE POND HABITAT		Large Water-plantain	Appalachian Mountain Boltonia	Cloud Sedge	Hop-like Sedge	Small Floating Manna Grass	Larger Canadian St. John's Wort	Water-marigold	Lake Water-cress	Wiry Panic Grass	Arum-leaf Arrowhead	Torrey's Bulrush	Small Burr-reed	Lesser Bladderwort
		Alisma triviale	*Boltonia montana*	*Carex haydenii*	*Carex lupuliformis*	*Glyceria borealis*	*Hypericum majus*	*Megalodonta beckii*	*Neobeckia lacustris*	*Panicum flexile*	*Sagittaria cuneata*	*Schoenoplectus torreyi*	*Sparganium natans*	*Utricularia minor*
9.5	Airborne Pollutants													
9.6	Excess Energy													
10	**Geological Events**													
10.1	Volcanoes													
10.2	Earthquakes/Tsunamis													
10.3	Avalanches/Landslides													
11	**Climate Change and Severe Weather**													
11.1	Habitat Shifting and Alteration	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
11.2	Droughts	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
11.3	Temperature Extremes													
11.4	Storms and Flooding	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
11.5	*Phenology and Pollination/Pollinators*													
STRESSES														

CMP THREATS & STRESSES TO STATE ENDANGERED PLANT SPECIES IN CALCAREOUS SINKHOLE POND HABITAT		Large Water-plantain	Appalachian Mountain Boltonia	Cloud Sedge	Hop-like Sedge	Small Floating Manna Grass	Larger Canadian St. John's Wort	Water-marigold	Lake Water-cress	Wiry Panic Grass	Arum-leaf Arrowhead	Torrey's Bulrush	Small Burr-reed	Lesser Bladderwort
		Alisma triviale	*Boltonia montana*	*Carex haydenii*	*Carex lupuliformis*	*Glyceria borealis*	*Hypericum majus*	*Megalodonta beckii*	*Neobeckia lacustris*	*Panicum flexile*	*Sagittaria cuneata*	*Schoenoplectus torreyi*	*Sparganium natans*	*Utricularia minor*
1	**Ecosystem/Community Stresses**													
1.1	Ecosystem Conversion	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
1.2	Ecosystem Degradation	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
1.3	Indirect Ecosystem Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
2	**Species stresses**													
2.1	Species mortality	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
2.2	Species disturbance													
2.3	Indirect species effects													

CMP THREATS & STRESSES TO WILDLIFE SGCN IN CALCAREOUS SINKHOLE POND HABITAT		Jefferson Salamander	Marbled Salamander	Long-tailed Salamander
		Ambystoma jeffersonianum	*Ambystoma opacum*	*Eurycea longicauda longicauda*
CMP THREATS				
1	**Residential and Commercial Development**			
1.1	Housing and Urban Areas	Y	Y	Y
1.2	Commercial and Industrial Areas	Y	Y	Y
1.3	Tourism and Recreation Areas	Y	Y	Y
2	**Agriculture and Aquaculture**			
2.1	Annual and Perennial Non-timber Crops	Y	Y	Y
2.2	Wood and Pulp Plantations	Y	Y	Y
2.3	Livestock Farming and Ranching	Y	Y	Y
2.4	Marine and Freshwater Aquaculture			
3	**Energy production and mining**			
3.1	Oil and Gas Drilling	Y	Y	Y
3.2	Mining and Quarrying	Y	Y	Y
3.3	Renewable Energy	Y	Y	Y
4	**Transportation and service corridors**			
4.1	Roads and Railroads	Y	Y	Y
4.2	Utility and Service Lines	Y	Y	Y
4.3	Shipping Lanes			
4.4	Flight Paths			
5	**Biological Resource Use**			
5.1	Hunting and Collecting Terrestrial Animals			
5.2	Gathering Terrestrial Plants			
5.3	Logging and Wood Harvesting	Y	Y	Y
5.4	Fishing and Harvesting Aquatic Resources			

CMP THREATS & STRESSES TO WILDLIFE SGCN IN CALCAREOUS SINKHOLE POND HABITAT		Jefferson Salamander	Marbled Salamander	Long-tailed Salamander
		Ambystoma jeffersonianum	*Ambystoma opacum*	*Eurycea longicauda longicauda*
6	**Human Intrusions and Disturbance**			
6.1	Recreational Activities	Y	Y	Y
6.2	War, Civil Unrest and Military Exercises	Y	Y	Y
6.3	Work and Other Activities	Y	Y	Y
7	**Natural System Modifications**			
7.1	Fire and Fire Suppression	Y	Y	Y
7.2	Dams and Water Management/Use	Y	Y	Y
7.3	Other Ecosystem Modifications	Y	Y	Y
8	**Invasive and other problematic species and genes**			
8.1	Invasive Non-native/Alien species	Y	Y	Y
8.2	Problematic Native Species	Y	Y	Y
8.3	Introduced Genetic Material			
9	**Pollution**			
9.1	Household Sewage and Urban Waste Water	Y	Y	Y
9.2	Industrial and Military Effluents	Y	Y	Y
9.3	Agricultural and Forestry Effluents	Y	Y	Y
9.4	Garbage and Solid Waste	Y	Y	Y
9.5	Airborne Pollutants			
9.6	Excess Energy			
10	**Geological Events**			
10.1	Volcanoes			
10.2	Earthquakes/Tsunamis			
10.3	Avalanches/Landslides			
11	**Climate Change and Severe Weather**			

CMP THREATS & STRESSES TO WILDLIFE SGCN IN CALCAREOUS SINKHOLE POND HABITAT		Jefferson Salamander	Marbled Salamander	Long-tailed Salamander
		Ambystoma jeffersonianum	*Ambystoma opacum*	*Eurycea longicauda longicauda*
11.1	Habitat Shifting and Alteration	Y	Y	Y
11.2	Droughts	Y	Y	Y
11.3	Temperature Extremes	Y	Y	Y
11.4	Storms and Flooding	Y	Y	Y
11.5	*Phenology and Pollination/Pollinators*			
CMP STRESSES				
1	**Ecosystem/Community Stresses**			
1.1	Ecosystem Conversion	Y	Y	Y
1.2	Ecosystem Degradation	Y	Y	Y
1.3	Indirect Ecosystem Effects	Y	Y	Y
2	**Species stresses**			
2.1	Species mortality	Y	Y	Y
2.2	Species disturbance	Y	Y	Y
2.3	Indirect species effects	Y	Y	Y

CMP THREATS & STRESSES TO STATE ENDANGERD PLANT SPECIES PINE BARREN SAVANNA HABITAT		Pickering's Reed Grass	Spreading Pogonia	Rough Cotton-grass	Pine Barren Boneset	New Jersey Rush	Bog Asphodel	Yellow Fringeless Orchid	Knieskern's Beaked-rush	Long's Woolgrass	Lace-lip Ladies'-tresses	False Asphodel	Reversed Bladderwort	Fringed Yellow-eyed-grass	Death-camus
		Calamagrostis pickeringii	*Cleistes divaricata*	*Eriophorum tenellum*	*Eupatorium resinosum*	*Juncus caesariensis*	*Narthecium americanum*	*Platanthera integra*	*Rhynchospora knieskernii*	*Scirpus longii*	*Spiranthes laciniata*	*Tofieldia racemosa*	*Utricularia resupinata*	*Xyris fimbriata*	*Zigadenus leimanthoides*
THREATS															
1	**Residential and Commercial Development**														
1.1	Housing and Urban Areas														
1.2	Commercial and Industrial Areas														
1.3	Tourism and Recreation Areas	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
2	**Agriculture and Aquaculture**														
2.1	Annual and Perennial Non-timber Crops	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
2.2	Wood and Pulp Plantations														
2.3	Livestock Farming and Ranching														
2.4	Marine and Freshwater Aquaculture														
3	**Energy production and mining**														
3.1	Oil and Gas Drilling														
3.2	Mining and Quarrying														
3.3	Renewable Energy														
4	**Transportation and service corridors**														
4.1	Roads and Railroads														
4.2	Utility and Service Lines	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

CMP THREATS & STRESSES TO STATE ENDANGERD PLANT SPECIES PINE BARREN SAVANNA HABITAT		Pickering's Reed Grass	Spreading Pogonia	Rough Cotton-grass	Pine Barren Boneset	New Jersey Rush	Bog Asphodel	Yellow Fringeless Orchid	Knieskern's Beaked-rush	Long's Woolgrass	Lace-lip Ladies'-tresses	False Asphodel	Reversed Bladderwort	Fringed Yellow-eyed-grass	Death-camus
		Calamagrostis pickeringii	*Cleistes divaricata*	*Eriophorum tenellum*	*Eupatorium resinosum*	*Juncus caesariensis*	*Narthecium americanum*	*Platanthera integra*	*Rhynchospora knieskernii*	*Scirpus longii*	*Spiranthes laciniata*	*Tofieldia racemosa*	*Utricularia resupinata*	*Xyris fimbriata*	*Zigadenus leimanthoides*
4.3	Shipping Lanes														
4.4	Flight Paths														
5	**Biological Resource Use**														
5.1	Hunting and Collecting Terrestrial Animals														
5.2	Gathering Terrestrial Plants	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5.3	Logging and Wood Harvesting	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5.4	Fishing and Harvesting Aquatic Resources														
6	**Human Intrusions and Disturbance**														
6.1	Recreational Activities	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
6.2	War, Civil Unrest and Military Exercises														
6.3	Work and Other Activities	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
7	**Natural System Modifications**														
7.1	Fire and Fire Suppression	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
7.2	Dams and Water Management/Use	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
7.3	Other Ecosystem Modifications														
8	**Invasive and other problematic species and genes**														

CMP THREATS & STRESSES TO STATE ENDANGERD PLANT SPECIES PINE BARREN SAVANNA HABITAT		Pickering's Reed Grass	Spreading Pogonia	Rough Cotton-grass	Pine Barren Boneset	New Jersey Rush	Bog Asphodel	Yellow Fringeless Orchid	Knieskern's Beaked-rush	Long's Woolgrass	Lace-lip Ladies'-tresses	False Asphodel	Reversed Bladderwort	Fringed Yellow-eyed-grass	Death-camus
		Calamagrostis pickeringii	*Cleistes divaricata*	*Eriophorum tenellum*	*Eupatorium resinosum*	*Juncus caesariensis*	*Narthecium americanum*	*Platanthera integra*	*Rhynchospora knieskernii*	*Scirpus longii*	*Spiranthes laciniata*	*Tofieldia racemosa*	*Utricularia resupinata*	*Xyris fimbriata*	*Zigadenus leimanthoides*
8.1	Invasive Non-native/Alien species														
8.2	Problematic Native Species	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
8.3	Introduced Genetic Material														
	8.2.1 Deer grazing	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	8.2.2 Beaver dam flooding	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
9	**Pollution**														
9.1	Household Sewage and Urban Waste Water	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
9.2	Industrial and Military Effluents														
9.3	Agricultural and Forestry Effluents	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
9.4	Garbage and Solid Waste														
9.5	Airborne Pollutants														
9.6	Excess Energy														
10	**Geological Events**														
10.1	Volcanoes														
10.2	Earthquakes/Tsunamis														
10.3	Avalanches/Landslides														
11	**Climate Change and Severe Weather**														

CMP THREATS & STRESSES TO STATE ENDANGERD PLANT SPECIES PINE BARREN SAVANNA HABITAT		Pickering's Reed Grass	Spreading Pogonia	Rough Cotton-grass	Pine Barren Boneset	New Jersey Rush	Bog Asphodel	Yellow Fringeless Orchid	Knieskern's Beaked-rush	Long's Woolgrass	Lace-lip Ladies'-tresses	False Asphodel	Reversed Bladderwort	Fringed Yellow-eyed-grass	Death-camus
		Calamagrostis pickeringii	*Cleistes divaricata*	*Eriophorum tenellum*	*Eupatorium resinosum*	*Juncus caesariensis*	*Narthecium americanum*	*Platanthera integra*	*Rhynchospora knieskernii*	*Scirpus longii*	*Spiranthes laciniata*	*Tofieldia racemosa*	*Utricularia resupinata*	*Xyris fimbriata*	*Zigadenus leimanthoides*
11.1	Habitat Shifting and Alteration	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
11.2	Droughts	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
11.3	Temperature Extremes														
11.4	Storms and Flooding	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
11.5	*Phenology and Pollination/Pollinators*	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
STRESSES															
1	**Ecosystem/Community Stresses**														
1.1	Ecosystem Conversion	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
1.2	Ecosystem Degradation	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
1.3	Indirect Ecosystem Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
2	**Species stresses**														
2.1	Species mortality														
2.2	Species disturbance														
2.3	Indirect species effects														

CMP THREATS & STRESSES TO WILDLIFE SGCN IN PINE BARREN SAVANNA HABITAT		Arogos Skipper	No Common Name	Red-headed Woodpecker	Helicta Satyr (formerly Georgie	Carter's Moth	Northern Parula	Southern Bog Lemming
		Atrytone arogos arogos	*Dichagyris reliqua*	*Melanerpes erythrocephalus*	*Neonympha helicta (formerly areolata)*	*Photedes (Spartiniphaga)*	*Setophaga (Parula) americana*	*Synaptomys cooperi*
THREATS								
1	**Residential and Commercial Development**							
1.1	Housing and Urban Areas			Y			Y	
1.2	Commercial and Industrial Areas			Y			Y	
1.3	Tourism and Recreation Areas							
2	**Agriculture and Aquaculture**							
2.1	Annual and Perennial Non-timber Crops							
2.2	Wood and Pulp Plantations							
2.3	Livestock Farming and Ranching							
2.4	Marine and Freshwater Aquaculture							
3	**Energy production and mining**							
3.1	Oil and Gas Drilling							
3.2	Mining and Quarrying							
3.3	Renewable Energy			Y			Y	
4	**Transportation and service corridors**							
4.1	Roads and Railroads			Y			Y	Y

4.2	Utility and Service Lines			Y			Y	
4.3	Shipping Lanes							
4.4	Flight Paths							
5	**Biological Resource Use**							
5.1	Hunting and Collecting Terrestrial Animals							
5.2	Gathering Terrestrial Plants							
5.3	Logging and Wood Harvesting			Y			Y	?
5.4	Fishing and Harvesting Aquatic Resources							
6	**Human Intrusions and Disturbance**							
6.1	Recreational Activities	Y						Y
6.2	War, Civil Unrest and Military Exercises							?
6.3	Work and Other Activities							
7	**Natural System Modifications**							
7.1	Fire and Fire Suppression	Y		Y			Y	?
7.2	Dams and Water Management/Use							
7.3	Other Ecosystem Modifications	Y				Y		
8	**Invasive and other problematic species and genes**							
8.1	Invasive Non-native/Alien species			Y			Y	Y
8.2	Problematic Native Species			Y			Y	
	8.2.1 Deer Grazing						Y	
	8.2.2 Beaver dam flooding	Y						?
8.3	Introduced Genetic Material							
9	**Pollution**							
9.1	Household Sewage and Urban Waste Water							?
9.2	Industrial and Military Effluents							?
9.3	Agricultural and Forestry Effluents			Y				?
9.4	Garbage and Solid Waste							
9.5	Airborne Pollutants			Y			Y	
9.6	Excess Energy							
10	**Geological Events**							

10.1	Volcanoes							
10.2	Earthquakes/Tsunamis							
10.3	Avalanches/Landslides							
11	**Climate Change and Severe Weather**							
11.1	Habitat Shifting and Alteration	?		Y			Y	Y
11.2	Droughts			Y			Y	Y
11.3	Temperature Extremes	?		Y			Y	?
11.4	Storms and Flooding						Y	?
11.5	*Phenology and Pollination/Pollinators*							
STRESSES								
1	**Ecosystem/Community Stresses**							
1.1	Ecosystem Conversion							
1.2	Ecosystem Degradation							
1.3	Indirect Ecosystem Effects							
2	**Species stresses**							
2.1	Species mortality							
2.2	Species disturbance							
2.3	Indirect species effects							

CMP THREATS & STRESSES TO STATE ENDANGERED PLANT SPECIES IN COASTAL PLAIN INTERMITTENT POND HABITAT		Southern Boltonia	Wrinkled Jointgrass	Marsh Flat Sedge	Hirst Brothers' Panic Grass	Larger Buttonweed	Knotted Spike-rush	Featherfoil	Barton's St. John's-wort	Clasping-leaf St. John's-wort	Boykin's Lobelia	Narrow-leaf Primrose-willow	Awned Meadow-beauty	Small-head Beaked-rush	Slender Arrowhead	Torrey's Bulrush	Dwarf White Bladderwort	Reversed Bladderwort
		Boltonia asteroides var. glastifolia	*Coelorachis rugosa*	*Cyperus pseudovegetus*	*Dichanthelium hirstii (Panicum hirstii)*	*Diodia virginiana*	*Eleocharis equisetoides*	*Hottonia inflata*	*Hypericum adpressum*	*Hypericum gymnanthum*	*Lobelia boykinii*	*Ludwigia linearis*	*Rhexia aristosa*	*Rhynchospora microcephala*	*Sagittaria teres*	*Schoenoplectus torreyi*	*Utricularia olivacea*	*Utricularia resupinata*
THREATS																		
1	**Residential and Commercial Development**																	
1.1	Housing and Urban Areas	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
1.2	Commercial and Industrial Areas	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
1.3	Tourism and Recreation Areas	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
2	**Agriculture and Aquaculture**																	
2.1	Annual and Perennial Non-timber Crops	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
2.2	Wood and Pulp Plantations																	
2.3	Livestock Farming and Ranching	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
2.4	Marine and Freshwater Aquaculture																	
3	**Energy production and mining**																	

3.1	Oil and Gas Drilling																	
3.2	Mining and Quarrying	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
3.3	Renewable Energy																	
4	**Transportation and service corridors**																	
4.1	Roads and Railroads	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4.2	Utility and Service Lines	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4.3	Shipping Lanes																	
4.4	Flight Paths																	
5	**Biological Resource Use**																	
5.1	Hunting and Collecting Terrestrial Animals																	
5.2	Gathering Terrestrial Plants	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5.3	Logging and Wood Harvesting	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5.4	Fishing and Harvesting Aquatic Resources																	
6	**Human Intrusions and Disturbance**																	
6.1	Recreational Activities	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
6.2	War, Civil Unrest and Military Exercises																	
6.3	Work and Other Activities	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
7	**Natural System Modifications**																	
7.1	Fire and Fire Suppression	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
7.2	Dams and Water Management/Use	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
7.3	Other Ecosystem Modifications	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
8	**Invasive and other problematic species and genes**																	
8.1	Invasive Non-native/Alien species	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
8.2	Problematic Native Species	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
8.3	Introduced Genetic Material																	
9	**Pollution**																	
9.1	Household Sewage and Urban Waste Water	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
9.2	Industrial and Military Effluents	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
9.3	Agricultural and Forestry Effluents	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
9.4	Garbage and Solid Waste	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

9.5	Airborne Pollutants																	
9.6	Excess Energy																	
10	**Geological Events**																	
10.1	Volcanoes																	
10.2	Earthquakes/Tsunamis																	
10.3	Avalanches/Landslides																	
11	**Climate Change and Severe Weather**																	
11.1	Habitat Shifting and Alteration	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
11.2	Droughts	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
11.3	Temperature Extremes																	
11.4	Storms and Flooding	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
11.5	*Phenology and Pollination/Pollinators*																	
STRESSES																		
1	**Ecosystem/Community Stresses**																	
1.1	Ecosystem Conversion	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
1.2	Ecosystem Degradation	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
1.3	Indirect Ecosystem Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
2	**Species stresses**																	
2.1	Species mortality																	
2.2	Species disturbance																	
2.3	Indirect species effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

CMP THREATS & STRESSES TO WILDLIFE SGCN IN COASTAL PLAIN INTERMITTENT POND HABITAT		Scarlet Bluet	Pine Barrens Bluet	Pine Barrens Treefrog	Golden-winged Skimmer	Carpenter Frog
		Enallagma pictum	*Enallagma recurvatum*	*Hyla andersonii*	*Libellula auripennis*	*Rana virgatipes*
THREATS						
1	**Residential and Commercial Development**					
1.1	Housing and Urban Areas	y	Y	Y	Y	Y
1.2	Commercial and Industrial Areas	y	Y	Y	Y	Y
1.3	Tourism and Recreation Areas			Y		Y
2	**Agriculture and Aquaculture**					
2.1	Annual and Perennial Non-timber Crops	Y	Y	Y	Y	Y
2.2	Wood and Pulp Plantations	Y	Y	Y	Y	Y
2.3	Livestock Farming and Ranching			Y		Y
2.4	Marine and Freshwater Aquaculture					
3	**Energy production and mining**					
3.1	Oil and Gas Drilling			Y		Y
3.2	Mining and Quarrying			Y		Y
3.3	Renewable Energy	?		Y		Y
4	**Transportation and service corridors**					
4.1	Roads and Railroads	Y	Y	Y	Y	Y
4.2	Utility and Service Lines			Y		Y
4.3	Shipping Lanes					
4.4	Flight Paths					
5	**Biological Resource Use**					
5.1	Hunting and Collecting Terrestrial Animals					
5.2	Gathering Terrestrial Plants					
5.3	Logging and Wood Harvesting	Y	Y	Y	Y	Y
5.4	Fishing and Harvesting Aquatic Resources					
6	**Human Intrusions and Disturbance**					

CMP THREATS & STRESSES TO WILDLIFE SGCN IN COASTAL PLAIN INTERMITTENT POND HABITAT		Scarlet Bluet	Pine Barrens Bluet	Pine Barrens Treefrog	Golden-winged Skimmer	Carpenter Frog
		Enallagma pictum	*Enallagma recurvatum*	*Hyla andersonii*	*Libellula auripennis*	*Rana virgatipes*
6.1	Recreational Activities	Y	Y	Y	Y	Y
6.2	War, Civil Unrest and Military Exercises			Y		Y
6.3	Work and Other Activities	?	?	Y	?	Y
7	**Natural System Modifications**					
7.1	Fire and Fire Suppression			Y		Y
7.2	Dams and Water Management/Use	Y	Y	Y	Y	Y
7.3	Other Ecosystem Modifications	Y	Y	Y	Y	Y
8	**Invasive and other problematic species and genes**					
8.1	Invasive Non-native/Alien species	Y	Y	Y	Y	Y
8.2	Problematic Native Species	Y	Y	Y	Y	Y
8.3	Introduced Genetic Material	Y	Y		Y	
9	**Pollution**					
9.1	Household Sewage and Urban Waste Water	Y	y	Y	Y	Y
9.2	Industrial and Military Effluents	Y	y	Y	Y	Y
9.3	Agricultural and Forestry Effluents	Y	y	Y	Y	Y
9.4	Garbage and Solid Waste	Y	y	Y	Y	Y
9.5	Airborne Pollutants	Y	y		Y	
9.6	Excess Energy					
10	**Geological Events**					
10.1	Volcanoes					
10.2	Earthquakes/Tsunamis					
10.3	Avalanches/Landslides					
11	**Climate Change and Severe Weather**					
11.1	Habitat Shifting and Alteration	Y	Y	Y	Y	Y
11.2	Droughts	Y	Y	Y	Y	Y

CMP THREATS & STRESSES TO WILDLIFE SGCN IN COASTAL PLAIN INTERMITTENT POND HABITAT		Scarlet Bluet	Pine Barrens Bluet	Pine Barrens Treefrog	Golden-winged Skimmer	Carpenter Frog
		Enallagma pictum	*Enallagma recurvatum*	*Hyla andersonii*	*Libellula auripennis*	*Rana virgatipes*
11.3	Temperature Extremes	Y	Y	Y	Y	Y
11.4	Storms and Flooding	Y	Y	Y	Y	Y
11.5	*Phenology and Pollination/Pollinators*					
STRESSES						
1	**Ecosystem/Community Stresses**					
1.1	Ecosystem Conversion	Y	Y	Y	Y	Y
1.2	Ecosystem Degradation	Y	Y	Y	Y	Y
1.3	Indirect Ecosystem Effects	Y	Y	Y	Y	Y
2	**Species stresses**					
2.1	Species mortality	Y	Y	Y	Y	Y
2.2	Species disturbance	Y	Y	Y	Y	Y
2.3	Indirect species effects	Y	Y	Y	Y	Y

Appendix D

Sample Sidebars and Information Boxes for SWAP 2015

Inventory and Monitoring

Goal: Inventory and monitor SGCN animals

Methods: Survey methods can range from a single site visit to multiple site visits; from counting from the edge of the habitat to walking transects through the habitat.
Differing plant and animal phenology means that surveying (and related disturbances) could potentially occur throughout the growing season, depending on what species are being monitored.

Impacts: Typical impacts to plant and animal species include trampling of vegetation, possible harm to larval invertebrates and nests of ground-nesting birds, disturbance to nesting birds during breeding season, transmission of invasive weed seeds into new habitat.

Challenge: How to monitor multiple species at a site without harm to species and/or habitat.

Recommendations:

- Develop a base map with locations of particularly rare or sensitive plant and animal species noted, before developing and implementing a monitoring plan.
- Stagger monitoring activities over several years. Do not survey all taxa at a site (e.g., birds, Lepidoptera, turtles, plants) in the same year if possible, and not year after year. Give the habitat a rest.
- Practice good field hygiene. Clean boots and other survey equipment between visits to different sites to prevent spread of weed seeds and/or disease.

Calcareous Fens – Vegetation Management

Conservation Action: Managing woody vegetation

Methods: May include manual removal (e.g., selective cutting and tree removal, mowing or brush-hogging), targeted use of herbicides, and/or use of grazing animals such as goats.

Impacts: Managing for one species may inadvertently harm others. Using goats to manage habitat for bog turtles, for example, will remove critical shrub habitat for scrub-shrub nesting birds and may result in the loss of rare plant populations grazed by goats and/or critical food plants required by rare Lepidoptera. Use of herbicides can harm non-target species.

Challenge: How best to manage fen vegetation for all fen-dependent species (e.g., scrub-shrub birds, rare plants, rare Lepidoptera, bog turtles, rare odonates)?

Recommendations:

- Where possible, manage fens holistically – protecting areas that meet the needs of scrub-shrub birds and rare Lepidoptera while also maintaining the more open areas needed by bog turtles and providing critical microclimates needed by rare plants.
- In some cases, individual sites may best be managed for a single species (e.g., bog turtles) whereas other sites can be managed for multiple species (e.g., rare plants and Lepidoptera).

Fire Management in New Jersey Pine Barrens Savannas

Challenge: Fire management, whether prescription burns or wildfire suppression, has a major effect on the persistence and quality of Pine Barrens habitats, including savannas and their associated rare plants and SGCN wildlife.

Recommendations:

- Thoroughly assess what rare plant and SGCN animals are present in the habitat, their tolerances to fire, and their distribution on the landscape
- Develop a plan for when and if to burn, what to burn, and how intensely. Consider the needs of all species, plant and animal, occurring at a site.
- Leave unburned refugia for plant and animal species. Do not burn entire sites in a season.
- Use care when locating firebreaks.
- Other vegetation management techniques such as mowing are sometimes used in place of fire. The ecological and species-specific effects of such management practices must be assessed for each rare species as to whether the results are beneficial, harmful, or benign.
- Research on fire and its effects on plants, habitats and wildlife SGCN will provide a better understanding of landscape effects of fire in Pine Barrens habitats.

Guidelines for Cleaning Field Equipment

To prevent the spread of invasive species propagules and/or disease pathogens (e.g. Chytrid fungus, Ranavirus) among wetland sites follow these recommendations between site visits: 1) wash boots and field equipment with soap and water; 2) rinse in clean water; and 3) disinfect with a 10% bleach solution and allow to air dry.

Did You Know?

Orchids can live underground for 20 or more years and reappear aboveground to flower when environmental conditions are just right.

APPENDIX E

N.J.A.C. 7:7A
Freshwater Wetlands Protection Act Rules
Statutory authority: N.J.S.A. 13:9B-1 et seq.
Date last amended: December 7, 2009

"Vernal habitat" means a wetland as identified at N.J.A.C. 7:7A-2.3, or State open water, as defined at N.J.A.C. 7:7A-1.4 above that meets all of the criteria at 1 through 4 below. Evidence of breeding by an obligate species under 2i below creates a rebuttable presumption that the criteria at 3 and 4 below are met:

1. Occurs in or contains a confined basin depression without a permanent flowing outlet;
2. Features evidence of breeding by one or more species of fauna adapted to reproduce in ephemeral aquatic conditions, identified in N.J.A.C. 7:7A, Appendix 1, incorporated herein by reference. The following shall constitute evidence of breeding by such a species:
    i. One or more obligate species listed in Appendix 1, or evidence of such a species, is found in or immediately adjacent to the area of ponded water; or
    ii. Two or more facultative species listed in Appendix 1, or evidence of the presence of such a species, are found in or immediately adjacent to the area of ponded water;
3. Maintains ponded water for at least two continuous months between March and September of a normal rainfall year; and
4. Is free of reproducing fish populations throughout the year, or dries up at some time during a normal rainfall year.

APPENDIX 1

OBLIGATE AND FACULTATIVE FAUNA SPECIES FOUND IN VERNAL HABITATS

Obligate Species
Marbled Salamander
Blue-spotted Salamander*
Jefferson Salamander
Eastern Tiger Salamander*
Wood Frog
Spotted Salamander
Eastern Spadefoot Toad
Jefferson x Blue-spotted Salamander*
Fairy shrimp (order Anostraca)

Facultative Species
Snapping Turtle
Eastern Mud Turtle

Spotted Turtle
Eastern Painted Turtle
Red-spotted Newt
American Toad
Fowler's Toad
Pine Barrens Treefrog*
Northern Gray Treefrog
Southern Gray Treefrog*
Upland Chorus Frog
Northern Cricket Frog
New Jersey Chorus Frog
Bull Frog
Green Frog
Southern Leopard Frog
Four-toed Salamander
Northern Spring Peeper
Long-tailed Salamander**
Wood Turtle**

*Listed as a New Jersey State endangered species
** Listed as a New Jersey State threatened species

SOURCE: http://www.nj.gov/dep/rules/rules/njac7_7a.pdf

Part 2: Distribution of Rare Plants and Natural Communities within New Jersey

Distribution of Rare Plants and Natural Communities within New Jersey

The following table provides information on the status and distribution of rare plants and natural communities, including the New Jersey landscape region in which they occur, and broad habitat associations. The habitat categories are the same 18 used to characterize the Conservation Focal Areas. An explanation of codes used by the NJDEP's Natural Heritage Program to characterize rare plants and natural communities follows this table.

		Status				Landscape Regions						Broad Habitat Category Associations																
Common Name	**Scientific Name**	**Federal Status**	**State Status**	**GRANK (per NatureServe)**	**SRANK (per NatureServe)**	**Atlantic Coastal Landscape**	**Delaware Bay Landscape**	**Marine Landscape**	**Piedmont Plains Landscape**	**Pinelands Landscape**	**Skylands Landscape**	**BARREN**	**BEACH-DUNE**	**GRASSLAND**	**NON-HABITAT**	**SHRUB UPLAND**	**SHRUB WETLAND**	**TIDAL WATER**	**UPLAND FOREST CON**	**UPLAND FOREST DEC**	**UPLAND FOREST MIX**	**URBANHAB**	**WATER**	**WETCOAST**	**WETDIST**	**WETEMERG**	**WETLAND FOREST CON**	**WETLAND FOREST DEC**	**WETLAND FOREST MIX**
RARE PLANTS																												
Balsam Fir	Abies balsamea		E	G5	S1						X									X	X		X					
American Sweetflag	Acorus americanus			G5	S1?				X		X															X			
Red Baneberry	Actaea rubra var. rubra			G5T5	S2						X									X									
Climbing Fumitory	Adlumia fungosa			G4	S2				X		X	X		X	X	X	X	X	X	X	X	X	X		X	X		X	
Sensitive Joint-vetch	Aeschynomene virginica	LT	E	G2	S1		X		X	X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Ear-leaf False Foxglove	Agalinis auriculata			G3	SX				X																				
Pine Barren Foxglove	Agalinis fasciculata			G5	S3					X							X		X						X			X
Small-flower False Foxglove	Agalinis paupercula var. paupercula			G5T5	S2						X									X		X	X					
Yellow Giant-hyssop	Agastache nepetoides			G5	S2		X		X	X	X	X		X	X	X	X	X	X	X	X	X	X	X		X	X	X	X
Purple Giant-hyssop	Agastache scrophulariifolia			G4	S2				X		X	X			X	X	X	X		X	X	X	X			X		X	
Small-fruit Grooveburr	Agrimonia microcarpa			G5	S2				X		X	X			X		X			X		X	X					X	
Ticklegrass	Agrostis geminata			G5	S1?						X									X	X		X			X		X	
Large Water-plantain	Alisma triviale		E	G5	S1						X									X			X					X	
Short-awn Meadow-foxtail	Alopecurus aequalis var. aequalis			G5T5?	S2				X		X			X	X	X	X		X	X	X		X			X	X	X	X
Tufted Meadow-foxtail	Alopecurus carolinianus			G5	S2				X					X	X														
Seabeach Amaranth	Amaranthus pumilus	LT	E	G2	S1	X		X				X	X		X	X		X				X	X	X					
Low Service-berry	Amelanchier humilis			G5	S1S2						X			X		X					X	X							
Nantucket Service-berry	Amelanchier nantucketensis			G3Q	S1	X			X	X		X	X			X													X
Round-leaf Service-berry	Amelanchier sanguinea var. sanguinea		E	G5T5	S1.1						X	X					X			X	X								
Running Service-berry	Amelanchier stolonifera			G5	S3	X	X		X	X	X	X				X				X									
Fly Poison	Amianthium muscitoxicum			G4G5	S2		X		X	X		X		X	X	X	X		X	X	X	X	X		X	X	X	X	X
Koehn's Toothcup	Ammannia latifolia		E	G5	S1		X											X				X		X					
Bog Rosemary	Andromeda polifolia var. glaucophylla		E	G5T5	S1						X				X	X	X			X	X	X	X			X	X	X	X
Hairy Beardgrass	Andropogon glomeratus var. hirsutior			G5T5	SH.1		X							X		X	X	X		X	X		X	X		X		X	X
Elliott's Beardgrass	Andropogon gyrans			G5	S2		X			X					X	X			X	X	X	X			X				X
Silvery Beardgrass	Andropogon ternarius var. ternarius			G5T5?	S2	X	X							X	X	X	X	X	X	X	X	X	X		X			X	X
Canada Anemone	Anemone canadensis			G5	SX				X		X																		
Long-head Anemone	Anemone cylindrica		E	G5	S1						X	X			X	X	X			X	X	X						X	

(Plant and natural community status and distribution continued)

		Status				Landscape Regions						Broad Habitat Category Associations																
Common Name	**Scientific Name**	**Federal Status**	**State Status**	**GRANK (per NatureServe)**	**SRANK (per NatureServe)**	**Atlantic Coastal Landscape**	**Delaware Bay Landscape**	**Marine Landscape**	**Piedmont Plains Landscape**	**Pinelands Landscape**	**Skylands Landscape**	**BARREN**	**BEACH-DUNE**	**GRASSLAND**	**NON-HABITAT**	**SHRUB UPLAND**	**SHRUB WETLAND**	**TIDAL WATER**	**UPLAND FOREST CON**	**UPLAND FOREST DEC**	**UPLAND FOREST MIX**	**URBANHAB**	**WATER**	**WETCOAST**	**WETDIST**	**WETEMERG**	**WETLAND FOREST CON**	**WETLAND FOREST DEC**	**WETLAND FOREST MIX**
RARE PLANTS *(continued)*																												
Riverbank Anemone	Anemone virginiana var. alba			G5T4T5	S2						X									X	X		X			X	X		
Hairy Angelica	Angelica venenosa			G5	S1S2						X				X	X				X		X	X			X		X	
Canada Pussytoes	Antennaria howellii ssp. canadensis		E	G5T5?	S1						X			X	X	X				X	X	X	X					X	
Puttyroot	Aplectrum hyemale		E	G5	S1				X		X			X	X	X	X		X	X	X	X	X			X		X	X
Drummond's Rockcress	Arabis drummondii		E	G5	S1.1	X							X		X							X							
Western Hairy Rockcress	Arabis hirsuta var. pycnocarpa			G5T5	S1						X	X			X	X			X	X	X	X							
Missouri Rock-cress	Arabis missouriensis		E	G5	S1.1				X		X								X	X			X						
Bristly Sarsaparilla	Aralia hispida			G5	S3				X		X	X								X	X								
Dwarf Mistletoe	Arceuthobium pusillum		E	G5	S1						X					X	X		X	X	X		X				X	X	X
Dragon Mouth	Arethusa bulbosa			G4	S2		X			X						X	X		X		X	X	X			X	X	X	X
Northern Jack-in-the-pulpit	Arisaema triphyllum ssp. stewardsonii			G5T4T5	S2						X						X												X
Curtiss' Three-awn Grass	Aristida dichotoma var. curtissii			G5T5	S3				X	X				X	X	X	X	X	X	X	X	X	X	X			X	X	
Woolly Three-awn Grass	Aristida lanosa		E	G5	S1				X	X				X	X	X			X	X	X	X	X						
Wand-like Three-awn Grass	Aristida virgata			G5T4T5	S2		X		X	X				X	X	X	X		X	X	X	X	X		X		X	X	X
Virginia Snakeroot	Aristolochia serpentaria			G4	S3				X		X			X	X	X			X	X	X		X					X	X
Leopardbane	Arnica acaulis			G4	SX.1					X						X					X								
Pale Indian Plantain	Arnoglossum atriplicifolium		E	G4G5	S1	X			X	X		X		X	X	X	X	X	X	X	X	X	X	X	X	X		X	X
Muehlenberg's Wild Caraway	Arnoglossum muehlenbergii			G4	SX.1				X																				
Beach Wormwood	Artemisia campestris ssp. caudata			G5T5	S2	X		X	X			X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Smooth Orange Milkweed	Asclepias lanceolata			G5	S2	X	X			X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Four-leaf Milkweed	Asclepias quadrifolia			G5	S3						X									X									
Red Milkweed	Asclepias rubra			G4G5	S2	X	X		X	X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
White Milkweed	Asclepias variegata			G5	S1		X		X					X	X	X	X		X	X	X	X	X			X	X	X	X
Whorled Milkweed	Asclepias verticillata			G5	S2		X		X		X	X		X	X	X	X		X	X	X	X	X			X	X	X	X
Pawpaw	Asimina triloba		E	G5	S1				X		X	X		X	X	X			X	X	X	X	X			X		X	
Bradley's Spleenwort	Asplenium bradleyi		E	G4	S1						X				X	X				X	X	X						X	
Mountain Spleenwort	Asplenium montanum			G5	S2						X	X			X	X			X	X	X	X	X					X	X
Lobed Spleenwort	Asplenium pinnatifidum		E	G4	S1						X	X			X					X									
Wall-rue	Asplenium ruta-muraria var. cryptolepis			G5T5	S2						X				X	X			X	X	X	X							
Rush Aster	Aster borealis		E	G5	S1						X					X	X			X	X		X			X		X	
Eastern Silvery Aster	Aster concolor			G5	S2	X	X		X	X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
White Heath Aster	Aster ericoides var. ericoides			G5T5	S1S2	X						X				X		X				X							
Prostrate White Heath Aster	Aster ericoides var. prostratus			G5T4T5Q	S3						X									X	X		X			X	X		
Marsh New York Aster	Aster novi-belgii var. elodes			G5TNR	S3		X		X	X							X									X		X	X
Willow-leaf Aster	Aster praealtus var. praealtus		E	G5T5?	S1						X			X	X	X	X			X		X							

(Plant and natural community status and distribution continued)

		Status				Landscape Regions						Broad Habitat Category Associations																
Common Name	**Scientific Name**	**Federal Status**	**State Status**	**GRANK (per NatureServe)**	**SRANK (per NatureServe)**	**Atlantic Coastal Landscape**	**Delaware Bay Landscape**	**Marine Landscape**	**Piedmont Plains Landscape**	**Pinelands Landscape**	**Skylands Landscape**	**BARREN**	**BEACH-DUNE**	**GRASSLAND**	**NON-HABITAT**	**SHRUB UPLAND**	**SHRUB WETLAND**	**TIDAL WATER**	**UPLAND FOREST CON**	**UPLAND FOREST DEC**	**UPLAND FOREST MIX**	**URBANHAB**	**WATER**	**WETCOAST**	**WETDIST**	**WETEMERG**	**WETLAND FOREST CON**	**WETLAND FOREST DEC**	**WETLAND FOREST MIX**
RARE PLANTS *(continued)*																												
Crooked-stem Aster	Aster prenanthoides			G4G5	S2						X								X	X	X		X			X		X	
Shining Aster	Aster puniceus var. firmus			G5T5	SX.1						X																X		
Low Rough Aster	Aster radula		E	G5	S1		X		X					X	X	X			X	X	X		X					X	X
Tradescant's Aster	Aster tradescantii			G4Q	S2						X								X	X	X		X			X	X	X	
Arrow-leaf Aster	Aster urophyllus			G4G5	S2						X				X					X									
Canadian Milk-vetch	Astragalus canadensis var. canadensis			G5T5	SX.1						X																		
Saline Orache	Atriplex subspicata		E	G5	S1	X						X	X																
Eastern Mosquito-fern	Azolla caroliniana			G5	S2				X						X											X			
Paper Birch	Betula papyrifera var. papyrifera			G5T5	S2				X		X					X	X		X	X	X	X	X					X	X
Swamp Birch	Betula pumila var. pumila			G5T5?	S2						X			X	X	X	X		X	X	X		X			X	X	X	
Estuary Burr-marigold	Bidens bidentoides			G3G4	S2		X		X			X		X	X	X	X	X		X	X	X	X	X	X	X		X	X
Eaton's Beggar-ticks	Bidens eatonii		E	G2G3	S1.1				X									X		X	X			X				X	
Small-fruit Beggars-ticks	Bidens mitis		E	G4?	S1		X						X	X		X	X	X		X				X				X	X
Downy Woodmint	Blephilia ciliata		E	G5	SH.1						X																		
Southern Boltonia	Boltonia asteroides var. glastifolia		E	G5TNR	S1		X								X								X			X		X	X
Appalachian Mountain Boltonia	Boltonia montana		E	G1G2	S2						X			X		X	X		X	X	X		X			X		X	
Lance-leaf Moonwort	Botrychium lanceolatum var. angustisegmentum			G5TNR	S2						X									X	X							X	
Leathery Grape Fern	Botrychium multifidum		E	G5	S1						X	X		X	X	X	X		X	X	X	X	X					X	
Blunt-lobe Grape Fern	Botrychium oneidense			G4	S2				X		X			X	X	X	X		X	X	X	X	X		X	X		X	
Upland Least Moonwort	Botrychium simplex var. laxifolium			G5TNR	SH						X					X				X	X		X			X		X	
Least Moonwort	Botrychium simplex var. simplex			G5T5	SH.1						X									X									
Slender Least Moonwort	Botrychium simplex var. tenebrosum			G5T4?Q	S2						X									X								X	
Side-oats Grama Grass	Bouteloua curtipendula var. curtipendula		E	G5T5	S1				X		X	X			X	X	X			X	X	X	X						
False Boneset	Brickellia eupatorioides var. eupatorioides		E	G5T5	S1						X	X		X	X	X				X	X		X					X	
Fringed Brome	Bromus ciliatus var. ciliatus			G5T5	S2						X						X									X		X	
Kalm's Brome	Bromus kalmii			G5	S2						X					X	X				X	X						X	
Early Brome	Bromus latiglumis			G5	S2S3				X		X						X											X	
Bluehearts	Buchnera americana			G5?	SX				X	X																			
Pickering's Reed Grass	Calamagrostis pickeringii		E	G4	S1				X	X							X		X		X		X			X	X	X	X
Wild Calla	Calla palustris			G5	S3						X						X		X	X	X					X	X	X	X
Marsh Water-starwort	Callitriche palustris			G5	S2				X		X			X	X	X	X	X		X	X	X	X	X		X		X	
Austin's Terrestrial Water-starwort	Callitriche terrestris			G5	S3				X		X												X			X		X	
Appalachian Bindweed	Calystegia sepium ssp. appalachiana			G5T4?	SU						X						X									X			
Occluded Bindweed	Calystegia sepium ssp. erratica		E	G5TNR	SH.1				X						X	X	X	X		X		X	X	X				X	
Erect Bindweed	Calystegia spithamaea ssp. spithamaea		E	G4G5T4T5	S1		X	X			X		X	X	X	X		X		X		X	X	X					
Slender Toothwort	Cardamine angustata			G5	S3				X		X				X	X	X			X			X					X	

(Plant and natural community status and distribution continued)

		Status				Landscape Regions						Broad Habitat Category Associations																
Common Name	**Scientific Name**	**Federal Status**	**State Status**	**GRANK (per NatureServe)**	**SRANK (per NatureServe)**	**Atlantic Coastal Landscape**	**Delaware Bay Landscape**	**Marine Landscape**	**Piedmont Plains Landscape**	**Pinelands Landscape**	**Skylands Landscape**	**BARREN**	**BEACH-DUNE**	**GRASSLAND**	**NON-HABITAT**	**SHRUB UPLAND**	**SHRUB WETLAND**	**TIDAL WATER**	**UPLAND FOREST CON**	**UPLAND FOREST DEC**	**UPLAND FOREST MIX**	**URBANHAB**	**WATER**	**WETCOAST**	**WETDIST**	**WETEMERG**	**WETLAND FOREST CON**	**WETLAND FOREST DEC**	**WETLAND FOREST MIX**
RARE PLANTS *(continued)*																												
Two-leaf Toothwort	Cardamine diphylla			G5	S3						X			X		X	X		X	X	X	X	X				X	
Purple Bittercress	Cardamine douglassii			G5	S2						X	X			X	X	X		X	X							X	
Long's Bittercress	Cardamine longii		E	G3?	SH	X			X		X																	
Large Toothwort	Cardamine maxima		E	G5	S1.1						X					X				X	X		X					
Meadow Cuckoo-flower	Cardamine pratensis var. palustris			G5T5	S3						X				X	X	X			X		X	X			X	X	X
Round-leaf Bittercress	Cardamine rotundifolia		E	G4	S1						X					X	X			X	X	X	X			X	X	
Glomerate Sedge	Carex aggregata			G5	S2				X		X			X	X	X	X		X	X	X	X	X		X		X	X
White Bear Lake Sedge	Carex albursina			G5	S2				X		X			X	X	X	X		X	X	X	X	X			X		X	
Foxtail Sedge	Carex alopecoidea		E	G5	S1						X	X		X	X	X				X	X	X	X		X	X		X	
Water Sedge	Carex aquatilis		E	G5	S1						X					X	X			X	X		X			X		X	X
Drooping Wood Sedge	Carex arctata		E	G5	S1						X									X	X								
Back's Sedge	Carex backii		E	G5	SH.1						X																		
Bebb's Sedge	Carex bebbii			G5	S2						X			X	X	X	X		X	X	X	X	X		X	X	X	X	X
Bicknell's Sedge	Carex bicknellii var. bicknellii			G5T5	S2						X	X			X	X	X		X	X	X	X							
Round-spike Brownish Sedge	Carex brunnescens var. sphaerostachya		E	G5T5	S1						X			X	X	X	X		X	X	X	X	X			X	X	X	X
Bush's Sedge	Carex bushii		E	G4	S1						X			X	X	X	X			X						X			
Brown Sedge	Carex buxbaumii			G5	S3				X		X	X		X	X	X	X		X	X	X	X	X		X	X	X	X	X
Silvery Sedge	Carex canescens var. canescens			G5T5	SU						X						X									X	X		
Carolina Sedge	Carex caroliniana			G5	S3				X						X	X	X			X	X								
Thin-leaf Sedge	Carex cephaloidea			G5	S2						X			X	X	X	X		X	X	X	X	X			X		X	
Soft Fox Sedge	Carex conjuncta			G4G5	S3						X									X								X	
Field Sedge	Carex conoidea			G5	S2				X		X			X	X	X	X		X	X		X				X	X		X
Crawe's Sedge	Carex crawei		E	G5	S1						X									X	X		X						
Crawford's Sedge	Carex crawfordii			G5	S2						X			X		X				X	X		X			X	X	X	X
Small Yellow Sedge	Carex cryptolepis			G4	S2						X			X	X	X	X		X	X	X	X	X		X	X	X	X	X
Clustered Sedge	Carex cumulata		E	G4?	SH	X				X		X		X	X	X	X	X	X	X	X	X	X	X			X	X	X	X
Dewey's Sedge	Carex deweyana var. deweyana		E	G5T5	S1						X	X		X	X				X	X	X	X	X			X		X	X
Lesser Panicled Sedge	Carex diandra			G5	S1						X			X	X	X	X		X	X	X	X	X		X	X		X	X
Soft-leaf Sedge	Carex disperma			G5	S1S2						X			X	X	X	X		X	X	X	X	X			X	X	X	X
Ebony Sedge	Carex eburnea			G5	S2						X	X		X	X	X	X		X	X	X	X	X		X	X		X	X
Florida Sedge	Carex floridana			G5?	S1					X						X					X								
Handsome Sedge	Carex formosa		E	G4	S1.1						X				X					X								X	
Cloud Sedge	Carex haydenii		E	G5	S1				X		X				X	X	X			X	X	X	X		X	X		X	
Hitchcock's Sedge	Carex hitchcockiana			G5	S2						X	X		X	X	X	X		X	X	X	X	X			X		X	X
Shore-line Sedge	Carex hyalinolepis			G4G5	SX.1				X																				

(Plant and natural community status and distribution continued)

		Status				Landscape Regions						Broad Habitat Category Associations																
Common Name	**Scientific Name**	**Federal Status**	**State Status**	**GRANK (per NatureServe)**	**SRANK (per NatureServe)**	**Atlantic Coastal Landscape**	**Delaware Bay Landscape**	**Marine Landscape**	**Piedmont Plains Landscape**	**Pinelands Landscape**	**Skylands Landscape**	**BARREN**	**BEACH-DUNE**	**GRASSLAND**	**NON-HABITAT**	**SHRUB UPLAND**	**SHRUB WETLAND**	**TIDAL WATER**	**UPLAND FOREST CON**	**UPLAND FOREST DEC**	**UPLAND FOREST MIX**	**URBANHAB**	**WATER**	**WETCOAST**	**WETDIST**	**WETEMERG**	**WETLAND FOREST CON**	**WETLAND FOREST DEC**	**WETLAND FOREST MIX**
RARE PLANTS *(continued)*																												
James' Sedge	Carex jamesii		E	G5	S1				X		X	X			X		X		X	X		X	X		X	X		X	
Cypress-swamp Sedge	Carex joorii		E	G4G5	S1.1		X														X	X					X	X
American Slender Sedge	Carex lasiocarpa var. americana			G5T5	S2						X			X		X	X			X	X		X			X		X	
Coupled Sedge	Carex laxiculmis var. copulata		E	G5T3T5	S1						X					X				X								X	
Leavenworth's Sedge	Carex leavenworthii			G5	SU		X									X													
Harper's Sedge	Carex leptalea var. harperi			G5T4T5	S3		X			X							X										X		
Fine-nerve Sedge	Carex leptonervia		E	G4	S1						X			X	X	X	X		X	X	X	X	X			X		X	
Mud Sedge	Carex limosa		E	G5	S1						X			X	X		X		X	X	X	X	X				X	X	X
Southern Long Sedge	Carex lonchocarpa			G5	S1S2		X			X							X									X	X		X
Louisiana Sedge	Carex louisianica		E	G5	S1						X																	X	
Hop-like Sedge	Carex lupuliformis		E	G4	S1						X			X		X			X	X	X		X			X		X	X
Mead's Sedge	Carex meadii		E	G4G5	S1				X											X									
Midland Sedge	Carex mesochorea			G4G5	S2				X							X				X		X							
Mitchell's Sedge	Carex mitchelliana			G4	S2	X	X		X	X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Few-fruit Sedge	Carex oligocarpa		E	G4	S1						X			X	X	X	X			X	X	X	X			X		X	X
Pale Sedge	Carex pallescens			G5	S2				X		X	X		X	X	X				X	X	X	X		X	X		X	
Peck's White-tinged Sedge	Carex peckii		E	G5	S1						X	X		X		X	X		X	X	X		X			X		X	
Narrow-leaf Sedge	Carex planispicata		E	G4Q	S1				X		X					X				X									
Plantain-leaf Sedge	Carex plantaginea		E	G5	S1.1						X				X					X	X								
Variable Sedge	Carex polymorpha		E	G3	S1				X		X				X	X	X		X	X	X	X	X			X	X	X	X
Prairie Sedge	Carex prairea			G5	S2				X		X	X		X	X	X	X		X	X	X	X	X		X	X		X	X
Cyperus-like Sedge	Carex pseudocyperus		E	G5	S1						X	X		X	X	X	X			X	X	X	X		X	X		X	
Retrorse Sedge	Carex retrorsa			G5	S2						X	X		X	X	X	X		X	X	X	X	X		X	X	X	X	X
Hillside Sedge	Carex siccata		E	G5	S1						X					X													
Seabeach Sedge	Carex silicea			G5	S3	X		X				X	X		X	X	X	X				X	X	X					
Dioecious Sedge	Carex sterilis			G4	S2						X	X		X	X	X	X		X	X	X	X	X		X	X	X	X	X
Large Awl-fruit Sedge	Carex stipata var. maxima		E	G5T5?	S1				X						X					X		X	X					X	
Quill Sedge	Carex tenera			G5	S2						X			X	X	X	X			X	X	X	X			X		X	X
Tuckerman's Sedge	Carex tuckermanii		E	G4	S1						X			X	X	X	X			X			X					X	
Cat-tail Sedge	Carex typhina			G5	S3		X		X		X	X		X	X	X	X	X	X	X	X	X	X	X		X	X	X	X
Bottle-shaped Sedge	Carex utriculata			G5	S2				X		X	X		X	X	X	X			X	X	X	X		X	X	X	X	X
Green Sedge	Carex viridula ssp. viridula			G5T5	S2						X			X	X	X	X		X	X	X	X	X		X	X	X	X	X
Willdenow's Sedge	Carex willdenowii var. willdenowii			G5T5	S2				X		X			X	X	X	X			X	X		X					X	
Wood's Sedge	Carex woodii		E	G4	S1.1						X								X								X		
Chinquapin	Castanea pumila		E	G5	S1		X		X					X	X	X	X		X	X	X	X	X				X	X	X

(Plant and natural community status and distribution continued)

		Status				Landscape Regions						Broad Habitat Category Associations																
Common Name	**Scientific Name**	**Federal Status**	**State Status**	**GRANK (per NatureServe)**	**SRANK (per NatureServe)**	**Atlantic Coastal Landscape**	**Delaware Bay Landscape**	**Marine Landscape**	**Piedmont Plains Landscape**	**Pinelands Landscape**	**Skylands Landscape**	**BARREN**	**BEACH-DUNE**	**GRASSLAND**	**NON-HABITAT**	**SHRUB UPLAND**	**SHRUB WETLAND**	**TIDAL WATER**	**UPLAND FOREST CON**	**UPLAND FOREST DEC**	**UPLAND FOREST MIX**	**URBANHAB**	**WATER**	**WETCOAST**	**WETDIST**	**WETEMERG**	**WETLAND FOREST CON**	**WETLAND FOREST DEC**	**WETLAND FOREST MIX**
RARE PLANTS *(continued)*																												
Scarlet Indian-paintbrush	Castilleja coccinea			G5	S2				X		X	X		X	X	X	X		X	X	X	X	X		X	X	X	X	X
Dwarf Hackberry	Celtis tenuifolia			G5	S2						X	X		X	X	X				X	X	X	X					X	
Erect Coinleaf	Centella erecta			G5	SX.1		X																						
Spurred Butterfly-pea	Centrosema virginianum		E	G5	SH	X						X			X	X	X	X				X		X		X		
Octoraro Creek Chickweed	Cerastium arvense var. villosissimum			G5T1	S1						X				X				X	X	X	X	X			X	X	X	X
Spiny Coontail	Ceratophyllum echinatum		E	G4?	S1S2		X		X		X			X	X	X	X		X	X	X	X	X			X	X	X	X
Redbud	Cercis canadensis var. canadensis		E	G5T5	S1				X						X	X	X			X		X	X		X			X	
Spreading Chervil	Chaerophyllum procumbens var. procumbens			G5T5	S3						X				X					X			X						
Devil's-bit	Chamaelirium luteum			G5	S3						X	X					X		X	X	X		X				X	X	
Indian Wood-oats	Chasmanthium latifolium			G5	S1		X																					X	X
Hairy Lipfern	Cheilanthes lanosa			G5	S2				X		X			X	X	X			X	X	X		X					X	
Large-calyx Goosefoot	Chenopodium berlandieri var. macrocalycium			G5T4	S2	X		X	X			X	X				X	X				X		X		X			
Narrow-leaf Goosefoot	Chenopodium pratericola			G5	S2		X							X								X	X	X		X		X	X
Red Goosefoot	Chenopodium rubrum		E	G5	S1		X			X								X				X		X					
Maple-leaf Goosefoot	Chenopodium simplex			G5	S2				X		X			X	X			X		X		X							
Stanley's Goosefoot	Chenopodium standleyanum			G5	S2				X		X									X		X							
Fringetree	Chionanthus virginicus			G5	S3		X		X										X	X								X	X
Slender Wood-reed	Cinna latifolia		E	G5	S1						X								X	X	X		X			X	X		
Tall Thistle	Cirsium altissimum			G5	SX.1				X							X				X									
Virginia Thistle	Cirsium virginianum		E	G3	S1	X											X				X			X			X		X
Hammond's Yellow Spring Beauty	Claytonia virginica var. hammondiae		E	G5T1	S1.1						X				X				X	X	X	X	X			X	X	X	X
Spreading Pogonia	Cleistes divaricata		E	G4	S1					X				X	X		X		X	X	X	X	X			X	X	X	X
Purple Clematis	Clematis occidentalis var. occidentalis			G5T5	S2				X		X	X		X	X	X	X		X	X	X	X	X			X		X	
Yellow Clintonia	Clintonia borealis			G5	S3						X						X		X	X	X						X	X	X
Butterfly-pea	Clitoria mariana		E	G5	S1	X	X					X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X
Long-bract Green Orchid	Coeloglossum viride var. virescens			G5T5	S2						X			X	X	X	X		X	X	X	X	X					X	
Wrinkled Jointgrass	Coelorachis rugosa		E	G5	S1		X			X				X									X			X	X	X	X
Marsh Cinquefoil	Comarum palustre		E	G5	SH						X			X	X	X	X		X	X	X	X	X			X	X	X	X
Slender Dayflower	Commelina erecta var. erecta		E	G5T5	SH				X			X								X									
Hemlock-parsley	Conioselinum chinense		E	G5	S1						X				X	X	X		X	X								X	X
Early Coralroot	Corallorhiza trifida			G5	S2				X		X			X	X	X	X		X	X	X	X	X			X	X	X	X
Spring Coralroot	Corallorhiza wisteriana			G5	SX				X																				
Broom Crowberry	Corema conradii		E	G4	S1					X		X		X	X	X	X	X	X		X	X	X	X		X	X		X
Rose-color Coreopsis	Coreopsis rosea			G3	S2		X		X	X	X	X		X	X	X	X		X	X	X	X	X		X	X	X	X	X
Pale Dogwood	Cornus amomum var. schuetzeana		E	G5T5	S1						X						X						X					X	
Bunchberry	Cornus canadensis			G5	S1S2						X				X	X	X			X	X		X					X	X

(Plant and natural community status and distribution continued)

		Status				Landscape Regions						Broad Habitat Category Associations																
Common Name	**Scientific Name**	**Federal Status**	**State Status**	**GRANK (per NatureServe)**	**SRANK (per NatureServe)**	**Atlantic Coastal Landscape**	**Delaware Bay Landscape**	**Marine Landscape**	**Piedmont Plains Landscape**	**Pinelands Landscape**	**Skylands Landscape**	**BARREN**	**BEACH-DUNE**	**GRASSLAND**	**NON-HABITAT**	**SHRUB UPLAND**	**SHRUB WETLAND**	**TIDAL WATER**	**UPLAND FOREST CON**	**UPLAND FOREST DEC**	**UPLAND FOREST MIX**	**URBANHAB**	**WATER**	**WETCOAST**	**WETDIST**	**WETEMERG**	**WETLAND FOREST CON**	**WETLAND FOREST DEC**	**WETLAND FOREST MIX**
RARE PLANTS *(continued)*																												
Stiff Dogwood	Cornus foemina			G5	S2					X					X							X						
Pear Hawthorn	Crataegus calpodendron		E	G5	S1						X			X	X	X	X		X	X	X	X	X		X	X		X	X
Fireberry Hawthorn	Crataegus chrysocarpa var. chrysocarpa			G5T5	S2						X			X	X	X			X	X	X	X	X			X		X	
Dodge's Hawthorn	Crataegus dodgei			G4	S2						X			X	X	X			X	X		X	X			X		X	
Holmes' Hawthorne	Crataegus holmesiana		E	G5	S1						X			X	X	X				X	X	X	X			X		X	
Scarlet Hawthorn	Crataegus pedicellata			G5	S1S2						X					X				X									
Pennsylvania Hawthorn	Crataegus pennsylvanica			G3Q	S1.1						X					X				X						X			
Dotted Hawthorn	Crataegus punctata			G5	S2				X		X				X	X				X		X	X			X		X	
Fleshy Hawthorn	Crataegus succulenta		E	G5	S1				X		X			X	X					X		X	X					X	
Elliptical Rushfoil	Croton willdenowii			G5	S2		X		X	X		X		X	X	X	X		X	X	X	X	X			X	X	X	X
Slender Rockbrake	Cryptogramma stelleri		E	G5	SH.1				X						X					X			X						
Blue Waxweed	Cuphea viscosissima			G5?	S3				X		X	X		X	X	X	X		X	X	X	X	X		X	X		X	X
Buttonbush Dodder	Cuscuta cephalanthi		E	G5	S1				X		X	X		X	X	X				X	X	X	X			X		X	
Hazel Dodder	Cuscuta coryli			G5?	S2		X		X	X				X	X	X				X			X			X		X	X
Collared Dodder	Cuscuta indecora var. indecora		E	G5T2T4	S1.1	X										X		X				X		X	X				
Smartweed Dodder	Cuscuta polygonorum			G5	S2	X	X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	
Northern Wild Comfrey	Cynoglossum virginianum var. boreale		E	G5T4T5	SH.1						X																		
Wild Comfrey	Cynoglossum virginianum var. virginianum			G5T5	S2				X		X	X		X	X	X	X			X	X	X	X			X		X	
Engelmann's Flat Sedge	Cyperus engelmannii			G4Q	S2		X		X					X	X	X	X	X		X		X	X	X	X	X		X	
Bristly Flat Sedge	Cyperus hystricinus		E	G4	SH					X		X				X			X										
Lancaster Flat Sedge	Cyperus lancastriensis		E	G5	S1				X	X		X				X	X			X	X	X			X		X	X	X
Plukenet's Flat Sedge	Cyperus plukenetii		E	G5	SH				X			X				X				X									
Coast Flat Sedge	Cyperus polystachyos var. texensis		E	G5T5	S1	X	X		X	X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Marsh Flat Sedge	Cyperus pseudovegetus		E	G5	S1	X				X						X	X					X		X					X
Reflexed Flat Sedge	Cyperus refractus		E	G5	SH		X																						
Rough Flatsedge	Cyperus retrofractus		E	G5	SH		X	X	X				X	X	X	X	X	X	X	X	X		X	X				X	
Schweinitz's Flat Sedge	Cyperus schweinitzii		E	G5	S1				X	X						X						X							
Small White Lady's-slipper	Cypripedium candidum		E	G4	S1						X						X											X	
Fen Small Yellow Lady's-slipper	Cypripedium parviflorum var. makasin			G5T4T5	S2						X			X			X		X	X	X	X	X		X	X		X	X
Showy Lady's-slipper	Cypripedium reginae		E	G4	S1						X			X	X	X	X			X	X	X	X			X		X	
Lowland Fragile Fern	Cystopteris protrusa			G5	S2				X		X			X	X	X				X	X	X	X					X	
Robin-run-away	Dalibarda repens		E	G5	SH.1				X											X									
Tufted Hair Grass	Deschampsia caespitosa			G5	S3						X			X	X	X	X		X	X	X	X	X			X	X	X	X
Toothed Tick-trefoil	Desmodium cuspidatum var. cuspidatum			G5T5?	S2				X		X			X	X	X	X	X	X	X	X	X	X	X		X		X	
Trailing Tick-trefoil	Desmodium humifusum		E	G1G2Q	S1		X		X					X	X	X	X			X	X	X						X	

(Plant and natural community status and distribution continued)

		Status				Landscape Regions						Broad Habitat Category Associations																
Common Name	**Scientific Name**	**Federal Status**	**State Status**	**GRANK (per NatureServe)**	**SRANK (per NatureServe)**	**Atlantic Coastal Landscape**	**Delaware Bay Landscape**	**Marine Landscape**	**Piedmont Plains Landscape**	**Pinelands Landscape**	**Skylands Landscape**	**BARREN**	**BEACH-DUNE**	**GRASSLAND**	**NON-HABITAT**	**SHRUB UPLAND**	**SHRUB WETLAND**	**TIDAL WATER**	**UPLAND FOREST CON**	**UPLAND FOREST DEC**	**UPLAND FOREST MIX**	**URBANHAB**	**WATER**	**WETCOAST**	**WETDIST**	**WETEMERG**	**WETLAND FOREST CON**	**WETLAND FOREST DEC**	**WETLAND FOREST MIX**
RARE PLANTS *(continued)*																												
Smooth Tick-trefoil	Desmodium laevigatum			G5	S3		X		X	X						X			X	X	X	X					X	X
Nuttall's Tick Trefoil	Desmodium nuttallii			G5	S2					X									X		X		X			X	X	
Cream-flower Tick-trefoil	Desmodium ochroleucum			G2	SX.1				X																			
Few-flower Tick-trefoil	Desmodium pauciflorum		E	G5	SH				X	X				X	X	X		X		X		X	X	X		X	X	
Sessile-leaf Tick-trefoil	Desmodium sessilifolium		E	G5	S1					X						X											X	
Pineland Tick-trefoil	Desmodium strictum			G4	S2		X			X		X			X	X	X	X	X	X	X	X	X	X	X	X	X	X
Velvety Tick-trefoil	Desmodium viridiflorum			G5?	S2	X	X		X	X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Squirrel-corn	Dicentra canadensis		E	G5	S1				X		X			X	X	X			X	X	X	X	X					X	
Wild Bleeding-heart	Dicentra eximia		E	G4	SH.1						X	X			X	X			X	X	X	X	X					X	
Larger Buttonweed	Diodia virginiana var. virginiana		E	G5T5	S1	X	X			X			X	X	X	X	X	X	X	X		X	X	X	X	X		X	X
Glade Fern	Diplazium pycnocarpon		E	G5	S1						X			X	X	X			X	X	X		X					X	
Leatherwood	Dirca palustris			G4	S2				X		X	X		X	X	X	X	X	X	X	X	X	X	X	X	X		X	
Cornel-leaf Aster	Doellingeria infirma			G5	S2		X		X		X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Carolina Whitlow-grass	Draba reptans		E	G5	SH				X		X			X	X					X		X	X					X	
Log Fern	Dryopteris celsa		E	G4	S1						X									X									
Clinton's Woodfern	Dryopteris clintoniana			G5	S3						X								X	X	X		X				X	X	
Goldie's Wood Fern	Dryopteris goldiana			G4	S3						X								X	X	X		X				X	X	
Small-spike Rough Barnyard Grass	Echinochloa muricata var. microstachya			G5T5	S1S2					X							X					X		X					
Dwarf Burrhead	Echinodorus parvulus			G3Q	SH.1				X						X					X			X						
American Waterwort	Elatine americana			G4	S2		X		X			X		X	X	X	X	X		X	X	X	X	X				X	
Small Waterwort	Elatine minima			G5	S3	X	X		X	X	X	X			X	X	X	X		X	X	X	X		X			X	X
Britton's Spike-rush	Eleocharis brittonii		E	G4G5	S1		X														X					X		X	X
Flat-stem Spike-rush	Eleocharis compressa		E	G4	S1						X									X	X		X			X	X	X	
Elliptic Spike-rush	Eleocharis elliptica			G5	S2						X			X	X	X	X			X	X		X			X			
Knotted Spike-rush	Eleocharis equisetoides		E	G4	S1					X													X						
Bald Spike-rush	Eleocharis erythropoda			G5	S3						X					X				X	X		X					X	
Salt-marsh Spike-rush	Eleocharis halophila			G4	S2	X		X	X				X		X	X		X		X		X							
Matted Spike-rush	Eleocharis intermedia			G5	S2						X	X		X	X	X	X		X	X	X	X	X		X	X		X	X
Black-fruit Spike-rush	Eleocharis melanocarpa		E	G4	S1		X		X			X		X	X	X			X	X	X	X	X			X	X	X	X
Small Spike-rush	Eleocharis minima			G4G5	SX.1		X																			X			
Pine Barren Spike-rush	Eleocharis olivacea var. reductiseta		E	G5T1T2	S1S2		X		X	X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Angled Spike-rush	Eleocharis quadrangulata			G4	S3		X		X	X	X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Few-flower Spike-rush	Eleocharis quinqueflora		E	G5	S1						X				X	X	X			X	X		X			X		X	
Warty Spike-rush	Eleocharis tenuis var. verrucosa		E	G5T3T5	S1.1				X							X	X												
Twisted Spike-rush	Eleocharis tortilis		E	G5	S1	X	X			X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

(Plant and natural community status and distribution continued)

		Status				Landscape Regions						Broad Habitat Category Associations																
Common Name	**Scientific Name**	**Federal Status**	**State Status**	**GRANK (per NatureServe)**	**SRANK (per NatureServe)**	**Atlantic Coastal Landscape**	**Delaware Bay Landscape**	**Marine Landscape**	**Piedmont Plains Landscape**	**Pinelands Landscape**	**Skylands Landscape**	**BARREN**	**BEACH-DUNE**	**GRASSLAND**	**NON-HABITAT**	**SHRUB UPLAND**	**SHRUB WETLAND**	**TIDAL WATER**	**UPLAND FOREST CON**	**UPLAND FOREST DEC**	**UPLAND FOREST MIX**	**URBANHAB**	**WATER**	**WETCOAST**	**WETDIST**	**WETEMERG**	**WETLAND FOREST CON**	**WETLAND FOREST DEC**	**WETLAND FOREST MIX**
RARE PLANTS *(continued)*																												
Carolina Elephant-foot	Elephantopus carolinianus		E	G5	SH				X							X	X	X	X	X			X	X				X	
Aunt Lucy	Ellisia nyctelea		E	G5	S1				X		X						X			X		X	X					X	
Slender Wheatgrass	Elymus trachycaulus		E	G5	S1						X					X				X	X	X						X	
One-sided Wheatgrass	Elymus trachycaulus ssp. subsecundus			G5T5	SU						X	X				X	X			X									
Narrow-leaf Fireweed	Epilobium angustifolium ssp. circumvagum			G5T5	S1S2				X	X	X	X		X	X	X	X	X	X	X	X	X	X		X	X	X	X	X
Bog Willowherb	Epilobium leptophyllum			G5	S2						X					X	X						X			X			
Downy Willowherb	Epilobium strictum			G5?	S2				X		X	X		X	X	X	X		X	X	X	X	X			X		X	X
Meadow Horsetail	Equisetum pratense		E	G5	S1						X									X			X					X	X
Woodland Horsetail	Equisetum sylvaticum			G5	S3						X						X		X	X								X	
Variegated Horsetail	Equisetum variegatum var. variegatum		E	G5T5	S1				X		X					X	X			X	X	X	X			X		X	
Frank's Love Grass	Eragrostis frankii			G5	S2				X		X	X		X	X	X	X		X	X	X	X	X			X	X	X	
Stout Love Grass	Eragrostis hirsuta		E	G5	S1.1		X									X			X	X									
Large-fruit Fireweed	Erechtites hieraciifolia var. megalocarpa			G5T3	S1S2	X							X		X	X	X	X	X	X		X	X	X	X	X		X	X
Parker's Pipewort	Eriocaulon parkeri			G3	S2	X	X		X	X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Slender Cotton-grass	Eriophorum gracile var. gracile		E	G5T4T5	SH						X	X		X	X	X	X		X	X	X	X	X			X		X	X
Rough Cotton-grass	Eriophorum tenellum		E	G5	S1	X	X		X	X	X																		
Sheathed Cotton-grass	Eriophorum vaginatum var. spissum		E	G5T5	SH						X				X		X			X			X				X	X	X
Thin-leaf Cotton-grass	Eriophorum viridicarinatum			G5	S3						X			X	X	X	X		X	X	X	X	X		X	X		X	X
Marsh Rattlesnake-master	Eryngium aquaticum var. aquaticum			G4T4	S3	X	X			X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Tall Rattlesnake-master	Eryngium yuccifolium var. yuccifolium			G5T5	SX					X																			
Wahoo	Euonymus atropurpurea var. atropurpurea			G5T5	S1?						X								X	X								X	
Vasey's Boneset	Eupatorium album var. vaseyi			G5T3T5	S2		X							X		X				X	X								
Smaller White Snakeroot	Eupatorium aromaticum var. aromaticum			G5T5	S1		X							X	X	X				X	X	X	X					X	X
Dog-fennel Thoroughwort	Eupatorium capillifolium		E	G5	S1S2	X	X					X	X		X	X	X	X	X	X	X	X	X	X	X	X	X		X
Mist-flower	Eupatorium coelestinum			G5	S3	X	X			X			X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X
Pine Barren Boneset	Eupatorium resinosum		E	G3	S2	X	X		X	X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Britton's Upland Boneset	Eupatorium sessilifolium var. brittonianum			G5T3T5	SU				X		X									X									
Flowering Spurge	Euphorbia corollata			G5	S1						X									X									
Darlington's Glade Spurge	Euphorbia purpurea		E	G3	S1		X		X					X	X	X	X	X		X	X	X	X	X		X		X	X
Queen-of-the-prairie	Filipendula rubra			G4G5	SX						X																		
Carolina Fimbry	Fimbristylis caroliniana			G4	S2	X											X						X					X	X
Marsh Fimbry	Fimbristylis castanea			G5	S3	X				X			X			X	X	X				X	X						
Hairy Fimbry	Fimbristylis puberula var. puberula			G5T5	S2					X					X		X		X										
Pumpkin Ash	Fraxinus profunda		E	G4	S1		X		X					X						X			X					X	X
Hairy Umbrella-sedge	Fuirena squarrosa			G4G5	S3	X															X		X	X		X	X	X	X

(Plant and natural community status and distribution continued)

		Status				Landscape Regions						Broad Habitat Category Associations																
Common Name	**Scientific Name**	**Federal Status**	**State Status**	**GRANK (per NatureServe)**	**SRANK (per NatureServe)**	**Atlantic Coastal Landscape**	**Delaware Bay Landscape**	**Marine Landscape**	**Piedmont Plains Landscape**	**Pinelands Landscape**	**Skylands Landscape**	**BARREN**	**BEACH-DUNE**	**GRASSLAND**	**NON-HABITAT**	**SHRUB UPLAND**	**SHRUB WETLAND**	**TIDAL WATER**	**UPLAND FOREST CON**	**UPLAND FOREST DEC**	**UPLAND FOREST MIX**	**URBANHAB**	**WATER**	**WETCOAST**	**WETDIST**	**WETEMERG**	**WETLAND FOREST CON**	**WETLAND FOREST DEC**	**WETLAND FOREST MIX**
RARE PLANTS *(continued)*																												
Downy Milk-pea	Galactia volubilis		E	G5	SH		X							X	X	X	X	X		X	X	X	X	X		X		X	X
Northern Bedstraw	Galium boreale			G5	S3						X									X	X		X			X	X		
Shining Bedstraw	Galium concinnum			G5	SX.1				X		X									X									
Coast Bedstraw	Galium hispidulum		E	G5	S1	X	X	X				X	X		X	X	X	X				X	X						
Labrador Marsh Bedstraw	Galium labradoricum		E	G5	S1						X			X		X	X		X	X	X		X			X		X	X
Marsh Bedstraw	Galium palustre			G5	S3						X			X	X	X	X		X	X	X	X	X			X	X	X	
Small Bedstraw	Galium trifidum var. trifidum			G5T5	S2						X			X	X	X	X			X	X		X			X		X	
Creeping-snowberry	Gaultheria hispidula		E	G5	S1						X						X		X	X	X		X			X	X	X	X
Biennial Beeblosom	Gaura biennis			G5	S3						X				X	X				X		X	X		X			X	
Fringed Bottle Gentian	Gentiana andrewsii var. andrewsii			G5?T5?	S2						X					X				X								X	
Pine Barren Gentian	Gentiana autumnalis			G3	S3	X	X			X		X		X	X	X	X	X	X	X	X	X	X	X	X			X	X
Catesby's Gentian	Gentiana catesbaei			G5	SX.1				X																				X
Narrow-leaf Gentian	Gentiana linearis		E	G4G5	SH						X						X		X	X	X						X	X	X
Soapwort Gentian	Gentiana saponaria var. saponaria			G5T5	S3				X	X				X		X				X		X	X					X	
Striped Gentian	Gentiana villosa			G4	SX.1		X																						
Stiff Gentian	Gentianella quinquefolia var. quinquefolia			G5T4T5	S2						X			X	X	X			X	X	X		X			X		X	
Sea-milkwort	Glaux maritima			G5	SX.1	X																							
Small Floating Manna Grass	Glyceria borealis		E	G5	SH.1						X			X	X				X	X	X	X	X						
American Manna Grass	Glyceria grandis var. grandis		E	G5T5	S1						X			X	X	X	X		X	X		X	X			X		X	
Northern Manna Grass	Glyceria laxa			G5	S1				X											X									
Small Everlasting	Gnaphalium helleri var. micradenium		E	G4G5T3?	SH		X			X				X	X	X	X		X	X	X	X	X			X	X	X	X
Winged Cudweed	Gnaphalium macounii		E	G5	SH				X		X																		
Checkered Rattlesnake-plantain	Goodyera tesselata			G5	SX.1						X																		
Hairy Hedge Hyssop	Gratiola pilosa			G5?	S2	X	X								X	X	X		X		X	X	X		X		X	X	
Round-fruit Hedge-hyssop	Gratiola virginiana			G5	S2	X	X					X					X	X			X			X		X	X	X	X
Oak Fern	Gymnocarpium dryopteris			G5	S1S2						X			X	X	X	X		X	X	X	X	X			X	X	X	X
Bearded Skeleton Grass	Gymnopogon ambiguus			G4	S3		X									X					X								
Short-leaf Skeleton Grass	Gymnopogon brevifolius		E	G5	SH		X							X	X	X				X	X	X	X	X				X	X
Sweet-scent Wild Caraway	Hasteola suaveolens			G4	SX.1				X																				
Hoary Frostweed	Helianthemum bicknellii			G5	S3						X									X									
Rough Ox-eye	Heliopsis helianthoides var. scabra			G5T5	SU				X					X		X													
Swamp-pink	Helonias bullata	LT	E	G3	S3	X	X		X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Canada Hawkweed	Hieracium kalmii var. fasciculatum		E	G5T3T5	S1						X									X			X						
Maryland Hawkweed	Hieracium marianum			G5?	SU				X		X	X								X									
Seabeach Sandwort	Honckenya peploides var. robusta		E	G5T4	S1	X	X	X				X	X		X	X	X	X				X	X	X		X			X

(Plant and natural community status and distribution continued)

		Status				Landscape Regions						Broad Habitat Category Associations																
Common Name	**Scientific Name**	**Federal Status**	**State Status**	**GRANK (per NatureServe)**	**SRANK (per NatureServe)**	**Atlantic Coastal Landscape**	**Delaware Bay Landscape**	**Marine Landscape**	**Piedmont Plains Landscape**	**Pinelands Landscape**	**Skylands Landscape**	**BARREN**	**BEACH-DUNE**	**GRASSLAND**	**NON-HABITAT**	**SHRUB UPLAND**	**SHRUB WETLAND**	**TIDAL WATER**	**UPLAND FOREST CON**	**UPLAND FOREST DEC**	**UPLAND FOREST MIX**	**URBANHAB**	**WATER**	**WETCOAST**	**WETDIST**	**WETEMERG**	**WETLAND FOREST CON**	**WETLAND FOREST DEC**	**WETLAND FOREST MIX**
RARE PLANTS *(continued)*																												
Featherfoil	Hottonia inflata		E	G4	S1		X		X		X				X	X	X		X	X	X	X	X		X	X	X	X	X
Long-leaf Summer Bluet	Houstonia longifolia			G4G5	SX					X																			
Tiny Bluets	Houstonia pusilla			G5	S2S3					X		X				X				X									
Green Violet	Hybanthus concolor		E	G5	S1				X		X			X	X	X			X	X	X	X	X			X			X
Golden Seal	Hydrastis canadensis		E	G4	S1				X						X	X				X									
Canby's Marsh-pennywort	Hydrocotyle prolifera			G5T5?	S1S2	X									X	X			X				X						
Floating Marsh-pennywort	Hydrocotyle ranunculoides		E	G5	S1				X		X	X		X	X	X				X		X	X	X		X			
Whorled Marsh-pennywort	Hydrocotyle verticillata var. verticillata			G5T5	S3	X	X					X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X
Broad-leaf Waterleaf	Hydrophyllum canadense		E	G5	S1						X			X	X	X	X			X		X	X		X	X		X	
Barton's St. John's-wort	Hypericum adpressum		E	G3	S2		X		X					X	X	X	X	X		X	X		X	X		X		X	X
Pale St. John's-wort	Hypericum ellipticum			G5	S2						X									X			X						
Clasping-leaf St. John's-wort	Hypericum gymnanthum		E	G4	S1		X		X	X				X	X	X	X		X	X	X	X	X		X	X	X	X	X
Larger Canadian St. John's Wort	Hypericum majus		E	G5	S1						X			X	X	X	X		X	X	X	X	X					X	X
Shrubby St. John's-wort	Hypericum prolificum		E	G5	S1						X			X	X	X	X			X		X	X			X		X	
Great St. John's-wort	Hypericum pyramidatum			G4	S3						X					X				X	X		X			X	X	X	
Large-leaf Holly	Ilex montana		E	G5	S1						X						X			X	X		X				X		X
False Pennyroyal	Isanthus brachiatus		E	G5	S1				X		X				X	X				X		X	X						
Lake Quillwort	Isoetes lacustris		E	G5	S1.1						X						X		X	X	X	X	X						
Black-base Quillwort	Isoetes melanopoda		E	G5	SH		X								X		X			X	X	X				X	X	X	X
Shore Quillwort	Isoetes riparia var. riparia			G5?T5?Q	S3		X		X						X		X	X		X		X	X	X				X	
Tuckerman's Quillwort	Isoetes tuckermanii		E	G4?	SH.1						X					X				X			X					X	
Small Whorled Pogonia	Isotria medeoloides	LT	E	G2	S1						X				X					X	X		X					X	
Twinleaf	Jeffersonia diphylla		E	G5	S1				X								X			X									
Butternut	Juglans cinerea			G4	S3				X		X					X				X	X		X					X	
Jointed Rush	Juncus articulatus			G5	S2	X	X	X				X	X	X	X	X	X	X		X	X	X	X		X			X	X
Short-fruit Rush	Juncus brachycarpus		E	G4G5	S1	X	X					X		X	X	X	X		X	X	X	X	X	X	X	X		X	X
Fen Rush	Juncus brachycephalus			G5	S3						X			X	X	X	X		X	X	X	X	X		X	X	X	X	X
Narrow-panicle Rush	Juncus brevicaudatus			G5	S2					X	X			X	X	X	X		X	X	X	X	X			X	X	X	X
New Jersey Rush	Juncus caesariensis		E	G2G3	S2	X	X		X	X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Awl-leaf Rush	Juncus coriaceus		E	G5	S1	X	X					X		X	X	X	X	X	X	X		X	X	X	X	X		X	X
Slim-pod Rush	Juncus diffusissimus		E	G5	S1.1	X										X								X					
Dudley's Rush	Juncus dudleyi			G5	S3						X			X		X	X				X	X						X	
Elliott's Rush	Juncus elliottii			G4G5	SX.1		X																						
Greene's Rush	Juncus greenei			G5	S2				X	X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Knotted Rush	Juncus nodosus var. nodosus			G5T5?	S3						X			X			X								X		X		

(Plant and natural community status and distribution continued)

		Status				Landscape Regions						Broad Habitat Category Associations																
Common Name	**Scientific Name**	**Federal Status**	**State Status**	**GRANK (per NatureServe)**	**SRANK (per NatureServe)**	**Atlantic Coastal Landscape**	**Delaware Bay Landscape**	**Marine Landscape**	**Piedmont Plains Landscape**	**Pinelands Landscape**	**Skylands Landscape**	**BARREN**	**BEACH-DUNE**	**GRASSLAND**	**NON-HABITAT**	**SHRUB UPLAND**	**SHRUB WETLAND**	**TIDAL WATER**	**UPLAND FOREST CON**	**UPLAND FOREST DEC**	**UPLAND FOREST MIX**	**URBANHAB**	**WATER**	**WETCOAST**	**WETDIST**	**WETEMERG**	**WETLAND FOREST CON**	**WETLAND FOREST DEC**	**WETLAND FOREST MIX**
RARE PLANTS *(continued)*																												
Torrey's Rush	Juncus torreyi		E	G5	S1		X		X							X					X					X		X	
Dwarf Juniper	Juniperus communis var. depressa			G5T5	S2						X									X									
Pale-laurel	Kalmia polifolia		E	G5	S1						X				X	X	X			X			X				X	X	X
Potato Dwarf-dandelion	Krigia dandelion		E	G5	SH.1		X							X	X	X	X			X	X		X					X	X
Low Spike Sedge	Kyllinga pumila		E	G5	SH		X		X																	X				
Grass-leaf Lettuce	Lactuca graminifolia			G5?	SU					X									X	X										
Red-stem Hairy Lettuce	Lactuca hirsuta var. sanguinea			G5?T5?	S2					X									X		X									
Cream Vetchling	Lathyrus ochroleucus		E	G5	SH				X		X																			
Veiny Vetchling	Lathyrus venosus			G5	SX						X																			
Large-pod Pinweed	Lechea intermedia var. intermedia			G5T4T5	S2						X			X	X	X				X		X	X					X	
Narrow-leaf Pinweed	Lechea tenuifolia		E	G5	S1					X	X									X		X								
Labrador Tea	Ledum groenlandicum		E	G5	S1						X										X		X							
Minute Duckweed	Lemna perpusilla		E	G5	S1		X		X			X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Star Duckweed	Lemna trisulca			G5	S2				X		X			X	X	X	X		X	X	X	X	X		X	X		X	X
Pale Duckweed	Lemna valdiviana		E	G5	S1				X						X					X		X	X		X			X	
Long-awn Sprangletop	Leptochloa fascicularis var. maritima			G5T3T4Q	S2	X							X			X		X							X				
Stueve's Downy Bush-clover	Lespedeza stuevei			G4?	S2		X			X		X		X	X	X	X		X	X	X	X	X				X	X	X
Northern Blazing-star	Liatris scariosa var. novae-angliae		E	G5?T3	SH				X						X				X	X	X	X						X	X
Blazing-star	Liatris spicata var. spicata			G5T5?	S3				X		X			X	X	X	X			X	X								X	
Wood Lily	Lilium philadelphicum var. philadelphicum			G5T4T5	S2						X					X				X	X									
American Frog's-bit	Limnobium spongia		E	G4	S1.1				X						X	X	X							X		X		X	
Awl-leaf Mudwort	Limosella australis		E	G4G5	S1	X			X						X		X	X		X		X	X	X	X	X		X	
Twinflower	Linnaea borealis var. americana		E	G5T5	SH						X						X											X	
Sandplain Flax	Linum intercursum		E	G4	S1		X		X	X				X	X	X	X		X	X	X	X	X				X	X	X
Grooved Yellow Flax	Linum sulcatum var. sulcatum		E	G5T5	S1						X	X			X	X	X			X	X	X	X		X	X		X	
Woodland Flax	Linum virginianum			G4G5	S3				X							X				X									
Small-flower Halfchaff Sedge	Lipocarpha micrantha		E	G5	S1						X				X	X	X			X	X	X	X		X	X		X	
Heartleaf Twayblade	Listera cordata var. cordata		E	G5T5	S1						X				X		X		X	X	X					X	X		X
Appalachian Twayblade	Listera smallii		E	G4	S1.1						X						X			X						X			X
Hoary Puccoon	Lithospermum canescens			G5	SX						X																			
Boykin's Lobelia	Lobelia boykinii		E	G2G3	S1		X			X							X		X			X	X			X	X	X	X
Canby's Lobelia	Lobelia canbyi			G4	S3		X			X				X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X
Water Lobelia	Lobelia dortmanna		E	G4G5	SH						X	X			X		X			X	X		X							
American Fly-honeysuckle	Lonicera canadensis		E	G5	S1						X				X	X	X		X	X	X	X	X			X	X	X	X
Tucker's Island Primrose-willow	Ludwigia brevipes			G2G3	SX.1	X																								

(Plant and natural community status and distribution continued)

		Status				Landscape Regions						Broad Habitat Category Associations																
Common Name	**Scientific Name**	**Federal Status**	**State Status**	**GRANK (per NatureServe)**	**SRANK (per NatureServe)**	**Atlantic Coastal Landscape**	**Delaware Bay Landscape**	**Marine Landscape**	**Piedmont Plains Landscape**	**Pinelands Landscape**	**Skylands Landscape**	**BARREN**	**BEACH-DUNE**	**GRASSLAND**	**NON-HABITAT**	**SHRUB UPLAND**	**SHRUB WETLAND**	**TIDAL WATER**	**UPLAND FOREST CON**	**UPLAND FOREST DEC**	**UPLAND FOREST MIX**	**URBANHAB**	**WATER**	**WETCOAST**	**WETDIST**	**WETEMERG**	**WETLAND FOREST CON**	**WETLAND FOREST DEC**	**WETLAND FOREST MIX**
RARE PLANTS *(continued)*																												
Hairy Primrose-willow	Ludwigia hirtella			G5	S2		X			X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Narrow-leaf Primrose-willow	Ludwigia linearis			G5	S2		X			X				X	X	X	X		X	X	X	X	X	X	X	X	X	X
Hairy Sundial Lupine	Lupinus perennis var. occidentalis			G5T3T5	S2		X		X	X	X	X		X	X	X	X		X	X		X	X			X	X	X
Sundial Lupine	Lupinus perennis var. perennis			G5T5?	S3		X		X	X	X				X	X	X		X	X	X	X					X	
Hairy Wood-rush	Luzula acuminata var. acuminata		E	G5T5	S1				X			X		X	X	X	X			X		X	X		X	X	X	
Carolina Club-moss	Lycopodiella caroliniana var. caroliniana			G5T4	S3					X						X	X		X							X	X	
Northern Bog Club-moss	Lycopodiella inundata			G5	S1S2				X		X				X	X	X		X	X	X	X	X			X	X	X	X
Stiff Club-moss	Lycopodium annotinum		E	G5	S1						X				X		X		X	X	X		X				X		
Hickey's Ground-pine	Lycopodium hickeyi			G5	S2S3						X									X			X					X	
Long's Bugleweed	Lycopus americanus var. longii			G5TNRQ	S2S3																								
Stalked Water-hoarhound	Lycopus rubellus			G5	S2		X							X				X						X		X		X	
Climbing Fern	Lygodium palmatum			G4	S2				X	X	X			X	X	X	X	X	X	X	X	X	X			X	X	X	X
Lowland Loosestrife	Lysimachia hybrida			G5	S3				X		X	X		X	X	X	X	X	X	X	X	X	X	X	X	X		X	X
Lance-leaf Loosestrife	Lysimachia lanceolata		E	G5	S1				X						X		X			X		X	X			X		X	
Tufted Loosestrife	Lysimachia thyrsiflora			G5	S3						X					X	X			X	X		X		X	X		X	
Winged Loosestrife	Lythrum alatum var. alatum			G5T5	S2						X									X		X							
Narrow-leaf Loosestrife	Lythrum lineare			G5	S3	X				X							X					X		X			X		X
Western False Lily-of-the-valley	Maianthemum canadense var. interius		E	G5T4	S1.1						X									X									
Three-leaf False Solomon's-seal	Maianthemum trifolium		E	G5	S1						X					X	X			X	X	X				X		X	
Bayard Long's Adder's-mouth	Malaxis bayardii		E	G1G2	SH						X																		
White Adder's-mouth	Malaxis brachypoda		E	G4Q	SH						X					X	X		X	X	X		X				X	X	X
Green Adder's-mouth	Malaxis unifolia		E	G5	SH				X	X	X			X	X	X	X		X	X	X	X	X				X	X	X
Spiny Wild Crabapple	Malus angustifolia var. puberula			G5?T2T4	S2	X	X							X	X	X	X	X	X	X	X		X	X			X	X	
Water-marigold	Megalodonta beckii		E	G4G5	S1						X			X	X				X	X			X						
Virginia Bunchflower	Melanthium virginicum		E	G5	S1				X		X	X		X	X	X	X		X	X	X	X	X		X	X		X	
Buck-bean	Menyanthes trifoliata			G5	S2						X	X		X	X	X	X		X	X	X	X	X			X		X	
Virginia Bluebells	Mertensia virginica			G5	S3				X											X			X					X	
Nuttall's Mudwort	Micranthemum micranthemoides		E	GH	SH				X			X			X	X	X	X		X		X	X	X	X	X		X	
Tall Millet Grass	Milium effusum		E	G5	SH.1						X																		
Muskflower	Mimulus moschatus var. moschatus			G5T5	S2						X	X		X	X	X	X		X	X	X	X	X			X	X	X	
Rock Sandwort	Minuartia michauxii var. michauxii		E	G5T5	SH						X			X	X	X			X	X	X	X	X						
Basil Beebalm	Monarda clinopodia		E	G5	SH				X		X			X	X	X	X			X		X	X			X		X	
Oswego-tea	Monarda didyma			G5	S2						X	X		X	X	X	X		X	X	X	X	X		X	X	X	X	
Purple Bergamot	Monarda media			G4?	SH																								
Long-awn Smoke Grass	Muhlenbergia capillaris var. capillaris		E	G5T5?	S1				X		X				X	X				X									

(Plant and natural community status and distribution continued)

		Status				Landscape Regions						Broad Habitat Category Associations																
Common Name	**Scientific Name**	**Federal Status**	**State Status**	**GRANK (per NatureServe)**	**SRANK (per NatureServe)**	**Atlantic Coastal Landscape**	**Delaware Bay Landscape**	**Marine Landscape**	**Piedmont Plains Landscape**	**Pinelands Landscape**	**Skylands Landscape**	**BARREN**	**BEACH-DUNE**	**GRASSLAND**	**NON-HABITAT**	**SHRUB UPLAND**	**SHRUB WETLAND**	**TIDAL WATER**	**UPLAND FOREST CON**	**UPLAND FOREST DEC**	**UPLAND FOREST MIX**	**URBANHAB**	**WATER**	**WETCOAST**	**WETDIST**	**WETEMERG**	**WETLAND FOREST CON**	**WETLAND FOREST DEC**	**WETLAND FOREST MIX**
RARE PLANTS *(continued)*																												
Eastern Smoke Grass	Muhlenbergia glomerata			G5	S2				X		X	X		X	X	X	X		X	X	X	X	X		X	X		X	X
Large Woodland Dropseed	Muhlenbergia sylvatica var. robusta			G5TNR	S2																							
Woodland Dropseed	Muhlenbergia sylvatica var. sylvatica			G5T3T5	S3																							
Pine Barren Smoke Grass	Muhlenbergia torreyana			G3	S3		X			X		X		X	X	X	X		X	X	X	X	X		X	X	X	X	X
Spring Forget-me-not	Myosotis verna			G5	S3																							
Sweetgale	Myrica gale			G5	S3						X						X								X		X	
Variable-leaf Water-milfoil	Myriophyllum heterophyllum			G5	S2				X	X					X	X	X	X		X		X	X	X			X	
Cutleaf Water-milfoil	Myriophyllum pinnatum		E	G5	S1	X	X		X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Common Water-milfoil	Myriophyllum sibiricum		E	G5	S1						X				X				X	X	X		X					
Slender Water-milfoil	Myriophyllum tenellum		E	G5	S1	X			X	X				X		X				X		X	X		X			X	X
Whorled Water-milfoil	Myriophyllum verticillatum		E	G5	SH		X		X		X			X	X	X	X		X	X		X	X			X	X	X	X
Thread-nymph	Najas gracillima			G5?	S2																							
Southern Water-nymph	Najas guadalupensis var. guadalupensis			G5T5	S3				X			X			X					X				X			X	
Bog Asphodel	Narthecium americanum		E	G2	S2	X				X		X		X	X	X	X	X	X	X	X	X	X	X		X	X	X	X
American Lotus	Nelumbo lutea		E	G4	S1				X		X			X	X	X	X	X	X	X	X	X	X	X		X		X	
Lake Water-cress	Neobeckia aquatica		E	G4?	SH						X			X	X	X			X	X	X	X	X			X		X	
Small Yellow Pond-lily	Nuphar microphyllum		E	G5T4T5	SH		X								X		X	X		X	X	X	X	X	X	X	X	X	X
Tuberous White Water-lily	Nymphaea odorata ssp. tuberosa			G5T5	S2						X				X								X					
Floatingheart	Nymphoides cordata			G5	S3		X			X	X	X			X	X	X		X	X	X	X	X		X	X	X	X	X
Virginia Pennywort	Obolaria virginica			G5	S2		X		X		X			X	X	X	X		X	X	X	X	X					X	X
Sea-beach Evening-primrose	Oenothera humifusa			G5	S2	X	X	X				X	X		X	X	X	X				X	X	X		X			
Oakes' Evening-primrose	Oenothera oakesiana			G4G5Q	S2	X	X	X				X	X		X	X	X	X			X	X	X		X	X			
Hairy Evening-primrose	Oenothera villosa ssp. villosa			G5T5?	SU																							
Virginia False-gromwell	Onosmodium virginianum		E	G4	S1		X		X	X	X	X		X	X	X	X		X	X	X	X	X		X		X	X	X
Northern Adder's-tongue	Ophioglossum pusillum			G5	S3		X		X	X									X	X	X						X	X	X
Southern Adder's-tongue	Ophioglossum vulgatum		E	G5	S1		X		X					X	X	X	X	X	X	X	X	X	X	X				X	X
Sidebells	Orthilia secunda			G5	S2						X								X	X								X	
White-grained Mountain-rice Grass	Oryzopsis asperifolia		E	G5	S1						X				X	X	X		X	X	X		X			X		X	X
Slender Mountain-rice Grass	Oryzopsis pungens		E	G5	SH.1						X										X	X							
Glandular Cinnamon Fern	Osmunda cinnamomea var. glandulosa			G5TNR	S2					X												X							X
American Ginseng	Panax quinquefolius			G3G4	S1				X		X	X		X	X	X	X		X	X	X	X	X			X		X	X
Bristling Panic Grass	Panicum aciculare		E	G5	SH		X			X				X	X	X	X		X	X	X	X	X			X		X	X
Walter Benner's Panic Grass	Panicum acuminatum var. acuminatum			G5T5	SX																								
Southern Seabeach Grass	Panicum amarum var. amarulum			G5T3T5	S3																								
Northern Panic Grass	Panicum boreale		E	G5	S1				X		X																		

(Plant and natural community status and distribution continued)

		Status				Landscape Regions						Broad Habitat Category Associations																
Common Name	**Scientific Name**	**Federal Status**	**State Status**	**GRANK (per NatureServe)**	**SRANK (per NatureServe)**	**Atlantic Coastal Landscape**	**Delaware Bay Landscape**	**Marine Landscape**	**Piedmont Plains Landscape**	**Pinelands Landscape**	**Skylands Landscape**	**BARREN**	**BEACH-DUNE**	**GRASSLAND**	**NON-HABITAT**	**SHRUB UPLAND**	**SHRUB WETLAND**	**TIDAL WATER**	**UPLAND FOREST CON**	**UPLAND FOREST DEC**	**UPLAND FOREST MIX**	**URBANHAB**	**WATER**	**WETCOAST**	**WETDIST**	**WETEMERG**	**WETLAND FOREST CON**	**WETLAND FOREST DEC**	**WETLAND FOREST MIX**
RARE PLANTS *(continued)*																												
Bluish Panic Grass	Panicum dichotomum var. roanokense			G5T4?	SH	X	X							X	X	X	X	X	X	X	X	X	X	X		X	X	X	X
Spotted-sheath Panic Grass	Panicum dichotomum var. yadkinense		E	G5T4Q	SH				X						X	X		X		X		X	X	X		X		X	
Wiry Panic Grass	Panicum flexile		E	G5	S1						X				X	X	X		X	X	X		X	X		X		X	
Gattinger's Witch Grass	Panicum gattingeri			G4	S1S2						X												X			X			
Maiden-cane	Panicum hemitomon			G5?	S2		X			X									X	X	X		X			X	X		X
Hirst Brothers' Panic Grass	Panicum hirstii	C	E	G1	S1					X							X						X			X	X		X
Rough Panic Grass	Panicum leucothrix			G4?Q	S1S2		X					X				X	X						X			X		X	X
Coastal-plain Panic Grass	Panicum longiligulatum		E	G4G5Q	SH.1		X								X	X	X	X			X	X		X				X	X
Few-flower Panic Grass	Panicum oligosanthes var. oligosanthes			G5T5?	S1S2				X		X			X	X		X			X			X			X		X	
Scribner's Panic Grass	Panicum oligosanthes var. scribnerianum			G5T5	S2																								
Dense Panic Grass	Panicum rigidulum var. condensum			G5T5?	SH																								
Sheathed Panic Grass	Panicum scabriusculum			G4	S3					X							X		X	X	X		X			X	X	X	X
White-edge Panic Grass	Panicum tenue			G5T4T5	SH		X							X	X	X	X			X	X	X	X		X			X	X
Wright's Panic Grass	Panicum wrightianum			G4	S2		X			X						X	X		X		X		X			X	X	X	X
Slender Panic Grass	Panicum xanthophysum		E	G5	SH.1						X					X				X	X	X						X	
Mountain Nailwort	Paronychia montana			G4	SH						X				X	X				X	X	X	X					X	
Mudbank Crown Grass	Paspalum dissectum			G4?	S2		X		X	X		X		X	X	X	X		X	X	X	X	X		X	X	X	X	X
Florida Crown Grass	Paspalum floridanum			G5	S3	X	X								X	X	X			X		X		X		X			
Ciliate-leaf Crown Grass	Paspalum setaceum var. ciliatifolium			G5T5	S2																								
Prostrate Crown Grass	Paspalum setaceum var. psammophilum			G5T4?	S2					X											X	X							X
Swamp Lousewort	Pedicularis lanceolata			G5	S3						X			X	X	X	X			X	X	X	X			X		X	
Smooth Cliffbrake	Pellaea glabella var. glabella			G5T5	S2						X				X	X				X		X	X					X	
Smooth Beardtongue	Penstemon laevigatus		E	G5	S1				X		X			X	X	X	X			X		X	X					X	
Fern-leaf Scorpion-flower	Phacelia bipinnatifida		E	G5	S1.1						X									X									
Wild Kidney Bean	Phaseolus polystachios var. polystachios			G5T5?	S2		X		X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X		X	
Northern Beech Fern	Phegopteris connectilis			G5	S2						X				X	X	X		X	X	X	X	X				X	X	X
Wild Blue Phlox	Phlox divaricata var. divaricata		E	G5T3T5	S1				X		X			X	X	X	X			X			X					X	
Spotted Phlox	Phlox maculata var. maculata			G5T4T5	S2	X	X		X		X	X		X	X	X	X	X	X	X	X	X	X	X	X	X		X	X
Downy Phlox	Phlox pilosa var. pilosa		E	G5T5	SH				X		X	X		X	X	X			X	X	X	X	X			X		X	
Fogfruit	Phyla lanceolata		E	G5	SH	X										X	X	X						X		X			
Strawberry-tomato	Physalis grisea			G5?	SH																								
Husk-tomato	Physalis pubescens var. integrifolia			G5T5?Q	SH																								
Red Spruce	Picea rubens		E	G5	S1						X	X			X	X	X		X	X	X	X	X			X	X	X	X
Table Mountain Pine	Pinus pungens		E	G4	S1.1						X				X						X							X	
Red Pine	Pinus resinosa		E	G5	S1.1						X								X	X	X								

(Plant and natural community status and distribution continued)

		Status				Landscape Regions						Broad Habitat Category Associations																
Common Name	**Scientific Name**	**Federal Status**	**State Status**	**GRANK (per NatureServe)**	**SRANK (per NatureServe)**	**Atlantic Coastal Landscape**	**Delaware Bay Landscape**	**Marine Landscape**	**Piedmont Plains Landscape**	**Pinelands Landscape**	**Skylands Landscape**	**BARREN**	**BEACH-DUNE**	**GRASSLAND**	**NON-HABITAT**	**SHRUB UPLAND**	**SHRUB WETLAND**	**TIDAL WATER**	**UPLAND FOREST CON**	**UPLAND FOREST DEC**	**UPLAND FOREST MIX**	**URBANHAB**	**WATER**	**WETCOAST**	**WETDIST**	**WETEMERG**	**WETLAND FOREST CON**	**WETLAND FOREST DEC**	**WETLAND FOREST MIX**
RARE PLANTS *(continued)*																												
Pond Pine	Pinus serotina			G5	S2		X		X	X				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Loblolly Pine	Pinus taeda			G5	S2	X	X		X	X		X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X
Sickle-leaf Golden-aster	Pityopsis falcata			G3G4	S3	X				X		X	X	X	X	X	X		X	X	X	X	X		X			X	
Wide-leaf Silkgrass	Pityopsis graminifolia var. latifolia			G5T5?	S1.1																								
Seaside Plantain	Plantago maritima var. juncoides			G5T5	S2	X							X		X	X	X	X				X		X	X	X			
Dwarf Plantain	Plantago pusilla		E	G5	SH		X					X		X	X	X	X		X	X	X	X	X	X			X	X	X
Yellow Fringed Orchid	Platanthera ciliaris			G5	S2		X		X	X	X	X		X	X	X	X		X	X	X	X	X			X	X	X	X
Crested Yellow Orchid	Platanthera cristata			G5	S3	X	X			X		X		X	X	X	X		X			X	X		X	X	X	X	X
Southern Rein Orchid	Platanthera flava var. flava		E	G4?T4?Q	S1		X																					X	X
Tubercled Rein Orchid	Platanthera flava var. herbiola			G4?T4Q	S2				X		X	X		X	X	X	X		X	X	X	X	X			X		X	X
Large Purple Fringed Orchid	Platanthera grandiflora			G5	S2						X						X			X								X	
Hooker's Orchid	Platanthera hookeri		E	G4	SH						X									X	X		X			X			
Leafy Northern Green Orchid	Platanthera hyperborea var. huronensis			G5T5?	SX																								
Yellow Fringeless Orchid	Platanthera integra		E	G3G4	S1					X				X		X	X		X			X					X	X	
Snowy Orchid	Platanthera nivea		E	G5	S1		X																		X		X	X	
Round-leaf Orchid	Platanthera orbiculata		E	G5	S1						X						X			X	X		X			X		X	
Purple Fringeless Orchid	Platanthera peramoena		E	G5	S1	X	X		X			X		X	X	X	X	X	X	X	X	X	X	X	X	X		X	X
Purple Fringed Orchid	Platanthera psycodes			G5	S2						X						X			X	X							X	
Camphorweed	Pluchea camphorata			G5	SX.1					X																			
Stinking Fleabane	Pluchea foetida var. foetida		E	G5T5	SH	X	X					X		X	X	X	X	X	X	X	X	X	X	X		X	X	X	X
Flexuous Spear Grass	Poa autumnalis		E	G5	SH.1				X																				
Drooping Spear Grass	Poa languida			G3G4Q	S2						X				X	X	X		X	X	X	X	X			X		X	X
Old-pasture Spear Grass	Poa saltuensis		E	G5	SH						X																		
Woodland Spear Grass	Poa sylvestris		E	G5	SH						X			X	X	X			X	X	X	X						X	
Threadfoot	Podostemum ceratophyllum			G5	S2						X									X	X		X			X		X	
Clammy-weed	Polanisia dodecandra ssp. dodecandra			G5T5?	SX																								
Greek-valerian	Polemonium reptans		E	G5	S1				X					X	X	X				X			X					X	
Jacob's Ladder	Polemonium vanbruntiae			G3G4	SX.1						X																		
Loose-spike Milkwort	Polygala ambigua			G5?	S2						X																	X	
Curtiss' milkwort	Polygala curtissii		E	G5	S1.1		X								X					X									
Pink Milkwort	Polygala incarnata		E	G5	SH		X							X	X	X			X	X	X	X						X	
Maryland Milkwort	Polygala mariana			G5	S2		X		X					X	X	X	X			X	X	X	X	X	X	X		X	X
Racemed Milkwort	Polygala polygama			G5	S2		X		X	X		X		X	X	X	X		X	X	X	X	X		X	X	X	X	X
Low Pine Barren Milkwort	Polygala ramosa			G5	SX.1		X																						
Seneca Snakeroot	Polygala senega		E	G4G5	S1.1						X				X					X									

(Plant and natural community status and distribution continued)

		Status				Landscape Regions						Broad Habitat Category Associations																
Common Name	**Scientific Name**	**Federal Status**	**State Status**	**GRANK (per NatureServe)**	**SRANK (per NatureServe)**	**Atlantic Coastal Landscape**	**Delaware Bay Landscape**	**Marine Landscape**	**Piedmont Plains Landscape**	**Pinelands Landscape**	**Skylands Landscape**	**BARREN**	**BEACH-DUNE**	**GRASSLAND**	**NON-HABITAT**	**SHRUB UPLAND**	**SHRUB WETLAND**	**TIDAL WATER**	**UPLAND FOREST CON**	**UPLAND FOREST DEC**	**UPLAND FOREST MIX**	**URBANHAB**	**WATER**	**WETCOAST**	**WETDIST**	**WETEMERG**	**WETLAND FOREST CON**	**WETLAND FOREST DEC**	**WETLAND FOREST MIX**
RARE PLANTS *(continued)*																												
Small's Knotweed	Polygonum buxiforme			G5	S3																							
Fringed Black-bindweed	Polygonum cilinode			G5	S2				X		X	X		X	X	X			X	X	X		X			X		X	X
Dense-flower Knotweed	Polygonum densiflorum		E	G5	S1	X	X							X	X	X	X		X	X	X	X		X		X	X	X	X
Erect Knotweed	Polygonum erectum			G5	S3																								
Sea-beach Knotweed	Polygonum glaucum		E	G3	S1	X		X					X		X			X											
Opelousas Water-pepper	Polygonum hydropiperoides var. opelousanum			G5TNRQ	S2	X	X		X					X	X		X			X		X	X		X			X	
Bristly Smartweed	Polygonum setaceum var. setaceum			G5T3T5	S2		X							X			X			X		X						X	X
Juniper-leaf	Polypremum procumbens		E	G5	S1		X			X		X			X	X	X		X	X	X	X	X		X		X	X	X
Swamp Cottonwood	Populus heterophylla			G5	S2		X		X		X	X			X		X			X		X	X					X	X
Indian Physic	Porteranthus trifoliatus			G4G5	S2						X				X	X	X		X	X	X	X	X				X	X	X
Algae-like Pondweed	Potamogeton confervoides			G4	S2					X	X				X		X		X		X	X	X			X	X	X	X
Illinois Pondweed	Potamogeton illinoensis		E	G5	S1						X	X			X	X	X			X	X	X	X		X	X		X	
Oakes' Pondweed	Potamogeton oakesianus			G4	S2		X		X	X				X	X	X	X		X	X	X	X	X	X		X	X	X	X
Blunt-leaf Pondweed	Potamogeton obtusifolius		E	G5	S1						X												X						
White-stem Pondweed	Potamogeton praelongus		E	G5	S1						X				X	X	X		X	X	X	X	X					X	
Robbin's Pondweed	Potamogeton robbinsii			G5	S2				X		X				X	X	X		X	X	X	X	X			X		X	
Eel-grass Pondweed	Potamogeton zosteriformis		E	G5	S1						X			X	X	X			X	X	X	X	X					X	
Tall Cinquefoil	Potentilla arguta var. arguta			G5T5?	S2						X	X				X			X	X	X		X					X	
Pine Barren Rattlesnake-root	Prenanthes autumnalis			G4G5	S2	X	X			X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Smooth Rattlesnake-root	Prenanthes racemosa var. racemosa		E	G5T4	SH				X		X				X	X	X			X		X	X		X	X		X	
Mackenzie's Mermaidweed	Proserpinaca intermedia			G4?Q	S3																								
Allegheny Plum	Prunus alleghaniensis var. alleghaniensis			G4T4	SX																								
Chickasaw Plum	Prunus angustifolia var. angustifolia			G5T4T5	S2		X		X	X		X		X	X	X	X	X	X	X	X	X	X	X		X	X	X	X
Low Sand Cherry	Prunus pumila var. depressa		E	G5T5	S1						X				X	X	X			X	X	X	X			X		X	
Appalachian Cherry	Prunus pumila var. susquehanae			G5T4	S3						X					X						X							
Wafer-ash	Ptelea trifoliata var. trifoliata		E	G5T5	S1				X		X	X			X	X	X	X		X	X	X	X		X	X		X	
Saltmarsh Alkali Grass	Puccinellia fasciculata			G3G5	S1S2	X	X	X				X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X
Basil Mountain-mint	Pycnanthemum clinopodioides		E	G1G2	S1						X	X					X			X	X	X							
Awned Mountain-mint	Pycnanthemum setosum			G4	S3	X				X			X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Torrey's Mountain-mint	Pycnanthemum torrei		E	G2	S1				X		X				X	X				X								X	
Greenish-flower Wintergreen	Pyrola chlorantha		E	G5	S1					X	X				X		X		X	X	X	X			X		X	X	X
Carolina desert-chicory	Pyrrhopappus carolinianus		E	G5	S1		X							X			X									X		X	
Shingle Oak	Quercus imbricaria		E	G5	S1.1				X						X					X		X						X	
Overcup Oak	Quercus lyrata		E	G5	S1		X		X					X		X	X			X							X	X	X

(Plant and natural community status and distribution continued)

		Status				Landscape Regions						Broad Habitat Category Associations																
Common Name	**Scientific Name**	**Federal Status**	**State Status**	**GRANK (per NatureServe)**	**SRANK (per NatureServe)**	**Atlantic Coastal Landscape**	**Delaware Bay Landscape**	**Marine Landscape**	**Piedmont Plains Landscape**	**Pinelands Landscape**	**Skylands Landscape**	**BARREN**	**BEACH-DUNE**	**GRASSLAND**	**NON-HABITAT**	**SHRUB UPLAND**	**SHRUB WETLAND**	**TIDAL WATER**	**UPLAND FOREST CON**	**UPLAND FOREST DEC**	**UPLAND FOREST MIX**	**URBANHAB**	**WATER**	**WETCOAST**	**WETDIST**	**WETEMERG**	**WETLAND FOREST CON**	**WETLAND FOREST DEC**	**WETLAND FOREST MIX**
RARE PLANTS *(continued)*																												
Mossy-cup Oak	Quercus macrocarpa var. macrocarpa		E	G5T5	S1.1						X								X							X	X	
Basket Oak	Quercus michauxii			G5	S3		X																				X	X
Water Oak	Quercus nigra		E	G5	S1		X							X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Allegheny Mountain Buttercup	Ranunculus allegheniensis		E	G4G5	S1.1						X			X	X	X	X	X	X	X		X	X	X	X	X	X	X
Water-plantain Spearwort	Ranunculus ambigens			G4	S2				X		X	X		X	X	X	X	X	X	X	X	X	X	X	X	X		X	X
Seaside Buttercup	Ranunculus cymbalaria		E	G5	SH	X							X		X	X		X		X		X	X	X	X		X	
Early Buttercup	Ranunculus fascicularis		E	G5	S1						X	X				X				X		X						
Yellow Water Buttercup	Ranunculus flabellaris			G5	S3						X	X		X	X	X	X		X	X	X	X	X		X	X		X	
Creeping Spearwort	Ranunculus flammula var. filiformis		E	G5T5	SH						X	X		X	X					X		X	X					X	
Long-beak Water Buttercup	Ranunculus longirostris			G5	S2				X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X		X	
Rock Buttercup	Ranunculus micranthus			G5	S2				X		X				X					X									
Bristly Buttercup	Ranunculus pensylvanicus			G5	S2						X												X					X	
Low Spearwort	Ranunculus pusillus var. pusillus			G5T4?	S2				X	X	X			X	X	X	X	X	X	X		X	X		X	X	X	X	
Thread-leaf Water Buttercup	Ranunculus trichophyllus var. trichophyllus			G5T5	S2						X			X	X	X	X		X	X	X		X					X	
Awned Meadow-beauty	Rhexia aristosa		E	G3	S1		X			X		X					X		X				X				X	X	X
Showy Meadow-beauty	Rhexia mariana var. ventricosa		E	G5T4T5	S1		X		X	X		X	X	X	X	X	X		X	X	X	X	X	X	X	X		X	X
Dwarf Azalea	Rhododendron atlanticum			G4G5	S2	X	X		X			X		X	X	X			X	X	X	X	X				X	X	X
Rhodora	Rhododendron canadense		E	G5	S1						X	X			X	X	X		X	X	X	X	X			X	X	X	X
Mountain Azalea	Rhododendron prinophyllum			G5	S3						X									X		X							
Capillary Beaked-rush	Rhynchospora capillacea		E	G4	S1						X			X	X	X	X		X	X	X		X			X		X	
Large-head Beaked-rush	Rhynchospora cephalantha			G5	S3		X			X				X	X	X	X		X	X	X	X	X		X	X	X	X	X
Thread-leaf Beaked-rush	Rhynchospora filifolia		E	G5	S1		X								X	X	X			X	X	X				X	X	X	X
Clustered Beaked-rush	Rhynchospora glomerata		E	G5T5?	SH		X					X		X	X	X	X		X	X	X	X	X	X		X	X	X	X
Gray's Beaked-rush	Rhynchospora grayi		E	G4	SH.1																								
Slender Horned-rush	Rhynchospora inundata			G4?	S2		X			X		X		X	X	X	X		X	X	X		X		X	X	X	X	X
Knieskern's Beaked-rush	Rhynchospora knieskernii	LT	E	G2	S2				X	X		X		X	X	X	X		X	X	X	X	X		X	X	X	X	X
Slender-fruit Beak Rush	Rhynchospora leptocarpa			G3	S1																								
Small-head Beaked-rush	Rhynchospora microcephala		E	G5T5	S1		X			X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Short-beaked Bald-rush	Rhynchospora nitens			G4?	S2		X		X	X						X	X		X	X	X	X	X			X	X	X	X
Few-flower Beaked-rush	Rhynchospora oligantha			G4	S2					X							X		X		X		X			X	X	X	X
Pale Beaked-rush	Rhynchospora pallida			G3	S3		X		X	X		X		X	X	X	X		X	X	X	X	X			X	X	X	X
Rare-flower Beaked-rush	Rhynchospora rariflora		E	G5	S1	X	X					X			X	X	X		X	X	X	X	X	X		X	X	X	X
Coarse Grass-like Beaked-rush	Rhynchospora recognita		E	G5?	S1	X	X		X			X		X	X	X	X		X	X	X	X	X		X		X	X	X
Long-beak Bald-rush	Rhynchospora scirpoides			G4	S2		X		X	X	X			X	X	X	X			X	X	X	X				X	X	X
Prickly Gooseberry	Ribes cynosbati			G5	S1				X																				

(Plant and natural community status and distribution continued)

		Status				Landscape Regions						Broad Habitat Category Associations																
Common Name	**Scientific Name**	**Federal Status**	**State Status**	**GRANK (per NatureServe)**	**SRANK (per NatureServe)**	**Atlantic Coastal Landscape**	**Delaware Bay Landscape**	**Marine Landscape**	**Piedmont Plains Landscape**	**Pinelands Landscape**	**Skylands Landscape**	**BARREN**	**BEACH-DUNE**	**GRASSLAND**	**NON-HABITAT**	**SHRUB UPLAND**	**SHRUB WETLAND**	**TIDAL WATER**	**UPLAND FOREST CON**	**UPLAND FOREST DEC**	**UPLAND FOREST MIX**	**URBANHAB**	**WATER**	**WETCOAST**	**WETDIST**	**WETEMERG**	**WETLAND FOREST CON**	**WETLAND FOREST DEC**	**WETLAND FOREST MIX**
RARE PLANTS *(continued)*																												
Skunk Currant	Ribes glandulosum		E	G5	S1.1						X								X	X	X							
Missouri Gooseberry	Ribes missouriense		E	G5	S2						X	X		X	X	X	X		X	X	X		X					X	X
Swamp Red Currant	Ribes triste			G5	SU																								
Smooth Rose	Rosa blanda var. blanda			G5T5Q	SU																								
Toothcup	Rotala ramosior			G5	S3		X		X	X	X	X		X	X	X	X		X	X	X	X	X	X	X	X	X	X	X
Clausen's Dewberry	Rubus ascendens			GNR	S1																								
Smooth Blackberry	Rubus canadensis		E	G5	S1						X								X	X	X		X				X	X	
Pollock's Mill Blackberry	Rubus gnarus			G3?	SH.1																								
Long's Blackberry	Rubus longii			G4?Q	S1		X																						
New Jersey Dewberry	Rubus novocaesarius		E	G1	S1.1		X								X					X								X	
Cold Spring Blackberry	Rubus originalis			G3?	S2																								
Highbush Blackberry	Rubus ostryifolius			G3?Q	SH.1	X			X				X		X	X		X		X		X							
Davis' Dewberry	Rubus pervarius			G4?	SH.1				X			X			X		X		X	X	X	X	X		X		X	X	X
Blanchard's Dewberry	Rubus recurvicaulis			G4?	S1.1					X																	X	X	X
Bristly Blackberry	Rubus setosus			G5	SH.1																								
Orange Coneflower	Rudbeckia fulgida var. fulgida		E	G5T4?	S1						X			X	X	X			X	X								X	
Showy Coneflower	Rudbeckia fulgida var. speciosa			G5T4?	SX.1																								
Carolina Petunia	Ruellia caroliniensis		E	G5	SH	X	X					X		X	X	X	X	X		X		X	X	X	X	X	X	X	X
Limestone Petunia	Ruellia strepens			G4G5	SX.1																								
Engelmann's Sorrel	Rumex hastatulus		E	G5	SH	X																							
Slender Marsh-pink	Sabatia campanulata			G5	S3	X				X					X	X	X	X	X		X	X		X			X	X	X
Large Marsh-pink	Sabatia dodecandra var. dodecandra			G5?T4T5	S2	X	X		X	X					X	X	X	X	X	X	X	X	X	X		X	X	X	X
Silver Plume Grass	Saccharum alopecuroidum		E	G5	SH				X			X			X	X		X		X		X		X					
American Cupscale	Sacciolepis striata		E	G5	SH	X		X					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X
Southern Arrowhead	Sagittaria australis		E	G5	S1		X		X	X		X		X	X	X	X	X	X	X	X	X	X	X		X	X	X	X
Mississippi Arrowhead	Sagittaria calycina var. calycina			G5T5?	S2				X													X			X				
Tidal Arrowhead	Sagittaria calycina var. spongiosa			G5T4	S3				X	X							X	X			X	X	X	X		X		X	
Arum-leaf Arrowhead	Sagittaria cuneata		E	G5	S1						X			X	X	X	X			X			X			X		X	
Narrow-leaf Arrowhead	Sagittaria filiformis		E	G4G5	SH						X												X						
Awl-leaf Arrowhead	Sagittaria subulata			G4	S2		X		X	X	X	X		X	X	X	X	X		X	X	X	X	X	X	X	X	X	X
Slender Arrowhead	Sagittaria teres		E	G3	S1		X			X		X		X	X	X	X		X	X	X	X	X		X		X	X	X
Hoary Willow	Salix candida			G5	S2						X	X		X	X	X	X		X	X	X	X	X			X		X	X
Shining Willow	Salix lucida ssp. lucida			G5T5	S1?						X			X	X					X	X		X			X	X	X	
Bog Willow	Salix pedicellaris		E	G5	S1				X		X	X		X	X	X	X		X	X	X	X	X		X	X		X	X
Autumn Willow	Salix serissima			G4	S2						X	X		X	X	X	X		X	X	X	X	X			X		X	X

(Plant and natural community status and distribution continued)

		Status				Landscape Regions						Broad Habitat Category Associations																
Common Name	**Scientific Name**	**Federal Status**	**State Status**	**GRANK (per NatureServe)**	**SRANK (per NatureServe)**	**Atlantic Coastal Landscape**	**Delaware Bay Landscape**	**Marine Landscape**	**Piedmont Plains Landscape**	**Pinelands Landscape**	**Skylands Landscape**	**BARREN**	**BEACH-DUNE**	**GRASSLAND**	**NON-HABITAT**	**SHRUB UPLAND**	**SHRUB WETLAND**	**TIDAL WATER**	**UPLAND FOREST CON**	**UPLAND FOREST DEC**	**UPLAND FOREST MIX**	**URBANHAB**	**WATER**	**WETCOAST**	**WETDIST**	**WETEMERG**	**WETLAND FOREST CON**	**WETLAND FOREST DEC**	**WETLAND FOREST MIX**
RARE PLANTS *(continued)*																												
Large-fruit Black-snakeroot	Sanicula trifoliata		E	G4	S1				X		X	X			X					X	X	X	X				X	
Arrow-grass	Scheuchzeria palustris var. americana		E	G5T5	SH						X			X	X	X	X			X			X			X	X	
Purple Oat	Schizachne purpurascens		E	G5	S1.1						X				X				X	X			X				X	
Curly Grass Fern	Schizaea pusilla			G3G4	S3	X	X			X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Hard-stem Bulrush	Schoenoplectus acutus var. acutus			G5T5	S3						X			X	X	X	X			X	X		X			X		
Saltmarsh Bulrush	Schoenoplectus maritimus		E	G5	S1		X		X						X	X	X	X		X		X	X	X		X	X	
New England Bulrush	Schoenoplectus novae-angliae			G5	S2		X		X	X				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Smith's Club-rush	Schoenoplectus smithii			G5?	S2		X		X							X	X	X		X	X	X	X	X				X	
Torrey's Bulrush	Schoenoplectus torreyi		E	G5?	S1				X		X			X	X	X	X			X		X	X						
Chaffseed	Schwalbea americana	LE	E	G2G3	S1	X	X			X		X		X	X	X	X		X	X	X	X	X		X	X	X	X
Black-girdle Woolgrass	Scirpus atrocinctus			G5	S2						X			X	X	X	X		X	X	X	X	X		X	X	X	X
Long's Woolgrass	Scirpus longii		E	G2G3	S2					X		X		X	X	X	X		X	X	X	X	X		X	X	X	X
Barberpole Bulrush	Scirpus microcarpus		E	G5	S1						X				X	X				X	X		X			X	X	
Stalked Woolgrass	Scirpus pedicellatus		E	G4	SH						X																	
Reddish Bulrush	Scirpus pendulus			G5	S3						X			X		X	X		X	X	X	X					X	X	
Carolina Nut-rush	Scleria pauciflora var. caroliniana			G5T4T5	S2					X	X	X		X	X	X			X	X	X	X	X				X		
Papillose Nut-rush	Scleria pauciflora var. pauciflora			G5T5?	S1?						X																		
Whorled Nut-rush	Scleria verticillata		E	G5	S1	X	X				X			X	X	X	X	X	X	X	X	X	X	X	X		X	X	
Bog Buttons	Sclerolepis uniflora			G4	S2		X			X		X		X	X	X	X		X	X	X	X	X		X	X	X	X	X
Small Skullcap	Scutellaria leonardii		E	G4T4	S1				X		X			X	X	X	X			X	X		X					X	X
Veined Skullcap	Scutellaria nervosa			G5	S2				X		X			X	X	X	X	X	X	X	X	X	X	X		X		X	X
Allegheny Stonecrop	Sedum telephioides			G4	SU.1						X																		
Rock Spike-moss	Selaginella rupestris			G5	S2				X		X	X		X	X	X			X	X	X	X	X					X	
Small's Groundsel	Senecio anonymus			G5	SU																								
Balsam Ragwort	Senecio pauperculus			G5	S3				X		X					X	X			X	X								
Woolly Ragwort	Senecio tomentosus			G4G5	S2		X								X	X	X		X	X	X	X					X	X
Seabeach Purslane	Sesuvium maritimum			G5	S2	X	X	X				X	X		X	X	X	X				X	X	X		X			
Giant Fox-tail	Setaria magna			G4G5	S2	X	X	X				X	X	X	X	X	X	X			X	X	X	X		X			
Three-toothed Cinquefoil	Sibbaldiopsis tridentata		E	G5	S1.1						X					X				X	X	X							
Wild-pink	Silene caroliniana var. pensylvanica			G5T4T5	S3				X		X	X				X			X	X	X							X	
Snowy Catchfly	Silene nivea		E	G4?	S1						X									X	X		X			X	X		
Sand-plain Blue-eyed Grass	Sisyrinchium fuscatum			G5?	S2		X		X	X		X		X	X	X	X		X	X	X	X	X		X	X	X	X	X
Strict Blue-eyed Grass	Sisyrinchium montanum var. crebrum			G5T4T5	S2						X			X	X	X			X	X	X	X	X			X	X	X	
Bear's-foot	Smallanthus uvedalius		E	G4G5	S1		X				X					X				X	X	X		X					X
Laurel-leaf Greenbrier	Smilax laurifolia			G5	S3					X							X										X		

(Plant and natural community status and distribution continued)

		Status				Landscape Regions						Broad Habitat Category Associations																
Common Name	**Scientific Name**	**Federal Status**	**State Status**	**GRANK (per NatureServe)**	**SRANK (per NatureServe)**	**Atlantic Coastal Landscape**	**Delaware Bay Landscape**	**Marine Landscape**	**Piedmont Plains Landscape**	**Pinelands Landscape**	**Skylands Landscape**	**BARREN**	**BEACH-DUNE**	**GRASSLAND**	**NON-HABITAT**	**SHRUB UPLAND**	**SHRUB WETLAND**	**TIDAL WATER**	**UPLAND FOREST CON**	**UPLAND FOREST DEC**	**UPLAND FOREST MIX**	**URBANHAB**	**WATER**	**WETCOAST**	**WETDIST**	**WETEMERG**	**WETLAND FOREST CON**	**WETLAND FOREST DEC**	**WETLAND FOREST MIX**
RARE PLANTS *(continued)*																												
Bamboo Vine	Smilax pseudochina			G4G5	S3					X							X		X				X				X	
Downy Carrion-flower	Smilax pulverulenta			G4G5	S3				X		X									X			X				X	X
Bristly Greenbrier	Smilax tamnoides			G5	S3						X			X						X		X					X	
Elliott's Goldenrod	Solidago elliottii			G5	S3		X		X	X							X		X		X	X		X		X	X	X
Hairy Goldenrod	Solidago hispida var. hispida			G5T5	SU																							
Prairie Goldenrod	Solidago rigida var. rigida		E	G5T5	S1						X	X			X	X	X		X	X	X	X	X				X	X	
Summer Goldenrod	Solidago rugosa ssp. rugosa var. sphagnophila			G5T3T5	S3					X												X						X	
Showy Goldenrod	Solidago speciosa var. speciosa			G5T5?	S2						X									X									
Stout Ragged Goldenrod	Solidago squarrosa			G4?	S2				X		X							X	X	X		X	X					X	
Wand-like Goldenrod	Solidago stricta			G5	S3	X				X				X	X	X	X		X		X	X	X	X		X	X	X	X
Late Goldenrod	Solidago tarda			G4?Q	S3		X			X						X	X			X	X					X	X		X
Flax-leaf Bog Goldenrod	Solidago uliginosa var. linoides			G4G5T4T5	S3						X					X	X				X							X	
Bog Goldenrod	Solidago uliginosa var. uliginosa			G4G5T4T5	S3		X										X												
American Mountain-ash	Sorbus americana			G5	S2						X	X								X	X	X							
Narrow-leaf Burr-reed	Sparganium angustifolium		E	G5	SH						X																		
Green-fruited Bur-reed	Sparganium chlorocarpum			G5	S3						X			X	X	X	X		X	X	X		X			X	X	X	X
Small Burr-reed	Sparganium natans		E	G5	S1						X				X		X			X	X		X					X	
Sphagnum	Sphagnum angustifolium		E	G5	S1						X						X			X			X			X		X	
Sphagnum	Sphagnum austinii			G4	SX					X																			
Sphagnum	Sphagnum capillifolium			G5	S2					X	X				X	X	X		X	X	X	X	X				X	X	X
Sphagnum	Sphagnum carolinianum			G3	S2					X				X	X	X	X		X	X	X	X	X			X	X	X	X
Sphagnum	Sphagnum centrale		E	G5	S1						X																	X	
Sphagnum	Sphagnum contortum		E	G5	S1						X									X			X					X	
Sphagnum	Sphagnum cribrosum		E	G3	S1		X			X					X						X		X			X		X	X
Sphagnum	Sphagnum cyclophyllum			G3	S2					X		X		X	X	X	X	X	X	X	X	X	X			X	X	X	X
Sphagnum	Sphagnum fuscum			G5	S2				X	X	X			X	X		X		X	X	X	X	X		X	X	X	X	X
Sphagnum	Sphagnum macrophyllum			G3G5	S2		X			X						X	X		X		X	X	X			X	X	X	X
Sphagnum	Sphagnum majus ssp. norvegicum		E	G5?TNR	S1.1						X					X	X			X								X	
Sphagnum	Sphagnum perichaetiale			G5	S2	X	X	X		X		X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X
Sphagnum	Sphagnum platyphyllum			G5	S1				X																				
Sphagnum	Sphagnum portoricense			G5	S2		X			X				X	X	X	X	X	X	X	X	X	X			X	X	X	X
Sphagnum	Sphagnum quinquefarium		E	G5	S1.1						X								X				X						
Sphagnum	Sphagnum riparium		E	G5	S1						X						X			X			X				X		X
Sphagnum	Sphagnum squarrosum			G5	S2						X						X		X	X	X		X			X	X		X
Sphagnum	Sphagnum strictum		E	G5	S1					X				X	X	X	X		X		X		X			X	X	X	X
Sphagnum	Sphagnum subfulvum		E	GNR	S1.1						X																	X	

(Plant and natural community status and distribution continued)

		Status				Landscape Regions						Broad Habitat Category Associations																
Common Name	**Scientific Name**	**Federal Status**	**State Status**	**GRANK (per NatureServe)**	**SRANK (per NatureServe)**	**Atlantic Coastal Landscape**	**Delaware Bay Landscape**	**Marine Landscape**	**Piedmont Plains Landscape**	**Pinelands Landscape**	**Skylands Landscape**	**BARREN**	**BEACH-DUNE**	**GRASSLAND**	**NON-HABITAT**	**SHRUB UPLAND**	**SHRUB WETLAND**	**TIDAL WATER**	**UPLAND FOREST CON**	**UPLAND FOREST DEC**	**UPLAND FOREST MIX**	**URBANHAB**	**WATER**	**WETCOAST**	**WETDIST**	**WETEMERG**	**WETLAND FOREST CON**	**WETLAND FOREST DEC**	**WETLAND FOREST MIX**
RARE PLANTS *(continued)*																												
Sphagnum	Sphagnum subsecundum		E	G5	S1					X	X						X						X			X	X		
Sphagnum	Sphagnum subtile			G5?Q	S2						X						X		X	X			X						
Sphagnum	Sphagnum tenellum			G5	S2					X				X	X	X	X		X	X	X	X	X			X	X	X	X
Sphagnum	Sphagnum teres			G5	S2						X			X			X		X	X			X			X		X	X
Sphagnum	Sphagnum warnstorfii			G5	S2						X	X		X	X	X	X		X	X	X	X	X		X	X		X	
Swamp Oats	Sphenopholis pensylvanica			G4	S2		X		X	X	X	X		X	X	X	X		X	X	X	X	X		X	X	X	X	X
Narrow-leaf Meadow-sweet	Spiraea alba var. alba			G5T5	S1S2						X									X	X		X			X			
Lace-lip Ladies'-tresses	Spiranthes laciniata		E	G4G5	S1		X			X							X		X		X		X			X	X	X	X
Shining Ladies'-tresses	Spiranthes lucida			G5	S2						X	X		X	X	X	X		X	X	X	X	X		X	X		X	X
Yellowish Nodding Ladies'-tresses	Spiranthes ochroleuca			G4	S3				X		X					X			X	X	X								
Fragrant Ladies'-tresses	Spiranthes odorata			G5	S2	X	X		X	X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Little Ladies'-tresses	Spiranthes tuberosa			G5	S3	X	X			X					X	X			X	X	X	X	X	X	X	X		X	X
Rough Rush-grass	Sporobolus clandestinus			G5	S3		X									X													
Long-leaf Rush-grass	Sporobolus compositus var. compositus			G5T5	S2					X	X	X		X	X	X	X			X	X		X						
Small Rush-grass	Sporobolus neglectus		E	G5	S1						X				X		X			X			X			X			
Hyssop Hedge-nettle	Stachys hyssopifolia			G4G5	S2		X		X		X	X		X	X	X	X		X	X	X	X	X		X	X		X	
Hairy Hedge-nettle	Stachys pilosa var. pilosa		E	G5T5?	SH																									
Smooth Hedge-nettle	Stachys tenuifolia			G5	S3				X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X		X	
Boreal Starwort	Stellaria borealis var. borealis		E	G5T5	S1						X						X		X	X	X		X			X	X	X	X
Star Chickweed	Stellaria pubera		E	G5	SH						X				X					X		X	X					X	
White Twisted-stalk	Streptopus amplexifolius var. amplexifolius		E	G5T5	S1						X								X	X	X								
Rosy Twisted-stalk	Streptopus lanceolatus		E	G5T5	S1						X				X		X		X	X	X	X	X				X	X	X
Pickering's Morning-glory	Stylisma pickeringii var. pickeringii		E	G4T3	S1					X				X	X	X	X	X	X	X	X	X	X				X	X	X
Pencil-flower	Stylosanthes biflora			G5	S3		X		X	X				X	X	X	X		X	X	X	X	X				X	X	X
American Seablite	Suaeda calceoliformis			G5	S3	X							X											X					
Roland's Seablite	Suaeda rolandii		E	G1G2	S1?		X																						
Yellow-pimpernel	Taenidia integerrima			G5	S3				X											X									
American Yew	Taxus canadensis			G5	S2				X		X	X		X	X	X	X		X	X	X	X	X			X		X	X
Hairy Germander	Teucrium canadense var. occidentale			G5T5?	SU						X	X		X	X	X	X			X	X	X	X		X	X		X	
Hairy-joint Meadow-parsnip	Thaspium barbinode			G5	SX				X																				
Purple Meadow-parsnip	Thaspium trifoliatum var. trifoliatum			G5T5	S3				X											X								X	
Arborvitae	Thuja occidentalis		E	G5	S1						X					X	X				X							X	X
Foamflower	Tiarella cordifolia var. cordifolia		E	G5T5	S1						X						X		X	X	X	X	X			X	X	X	
False Asphodel	Tofieldia racemosa		E	G5	S1					X				X	X	X	X		X	X	X	X	X		X	X	X	X	X

(Plant and natural community status and distribution continued)

		Status				Landscape Regions						Broad Habitat Category Associations																
Common Name	**Scientific Name**	**Federal Status**	**State Status**	**GRANK (per NatureServe)**	**SRANK (per NatureServe)**	**Atlantic Coastal Landscape**	**Delaware Bay Landscape**	**Marine Landscape**	**Piedmont Plains Landscape**	**Pinelands Landscape**	**Skylands Landscape**	**BARREN**	**BEACH-DUNE**	**GRASSLAND**	**NON-HABITAT**	**SHRUB UPLAND**	**SHRUB WETLAND**	**TIDAL WATER**	**UPLAND FOREST CON**	**UPLAND FOREST DEC**	**UPLAND FOREST MIX**	**URBANHAB**	**WATER**	**WETCOAST**	**WETDIST**	**WETEMERG**	**WETLAND FOREST CON**	**WETLAND FOREST DEC**	**WETLAND FOREST MIX**
RARE PLANTS *(continued)*																												
Fernald's False Manna Grass	Torreyochloa pallida var. fernaldii			G5T4Q	S1S2						X						X			X							X	
Poison-oak	Toxicodendron pubescens			G5	S3		X														X							
Ohio Spiderwort	Tradescantia ohiensis			G5	S2				X		X				X	X				X			X					
Fraser's St. John's-wort	Triadenum fraseri			G5	S3						X			X	X	X	X		X	X	X	X	X		X	X		X	
Walter's St. John's-wort	Triadenum walteri		E	G5	S1		X								X		X			X	X	X			X			X	X
Weft Fern	Trichomanes intricatum		E	G4G5	S1.1						X								X		X								X
Narrow-leaf Bluecurls	Trichostema setaceum			G5	S2	X	X		X	X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Chapman's Redtop	Tridens flavus var. chapmanii		E	G5T3	SH	X				X																			
Seaside Arrow-grass	Triglochin maritima		E	G5	S1				X		X			X	X	X	X	X	X	X	X	X	X	X		X		X	X
Large-flower Trillium	Trillium grandiflorum		E	G5	S1.1				X					X		X				X									
Painted Trillium	Trillium undulatum			G5	S2						X						X		X		X					X	X	X	X
Narrow-leaf Horse-gentian	Triosteum angustifolium		E	G5	SH				X		X	X		X	X	X	X			X	X	X	X			X		X	
Three Birds Orchid	Triphora trianthophora		E	G3G4	S1						X				X					X			X					X	
Spreading Globe Flower	Trollius laxus ssp. laxus		E	G5T3	S1						X			X	X	X	X		X	X	X	X	X		X	X	X	X	X
Rock Elm	Ulmus thomasii			G5	SX																								
Two-flower Bladderwort	Utricularia biflora		E	G5	S1				X	X				X	X	X	X			X	X	X	X		X	X	X	X	X
Humped Bladderwort	Utricularia gibba			G5	S3		X		X	X	X			X	X	X	X			X	X	X	X			X		X	
Large Swollen Bladderwort	Utricularia inflata			G5	S3					X	X								X	X		X	X			X	X		
Flat-leaf Bladderwort	Utricularia intermedia			G5	S3	X					X	X		X	X	X	X		X	X	X	X	X	X		X	X	X	X
Lesser Bladderwort	Utricularia minor		E	G5	S1		X				X			X	X	X	X		X	X	X	X	X	X		X		X	
Dwarf White Bladderwort	Utricularia olivacea		E	G4	S1.1					X													X						
Purple Bladderwort	Utricularia purpurea			G5	S3		X		X	X	X	X			X		X	X	X	X	X	X	X		X	X	X	X	X
Small Swollen Bladderwort	Utricularia radiata			G4	S3		X								X						X					X		X	X
Reversed Bladderwort	Utricularia resupinata		E	G4	S1		X			X		X			X	X	X		X	X			X		X		X		X
Pine Barren Bellwort	Uvularia puberula var. nitida		E	G5T2T3	S2	X			X	X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Small Cranberry	Vaccinium oxycoccos			G5	S2						X	X		X	X	X	X		X	X	X	X	X			X	X	X	X
Goose-foot Cornsalad	Valerianella chenopodiifolia		E	G4	SH.1				X																				
Beaked Cornsalad	Valerianella radiata		E	G5	S1		X			X				X	X	X	X			X	X	X	X	X		X		X	X
Navel Cornsalad	Valerianella umbilicata		E	G4G5	SH																								
Narrow-leaf Vervain	Verbena simplex		E	G5	S1					X	X			X	X	X	X		X	X	X	X	X				X	X	X
Broad-leaf Ironweed	Vernonia glauca		E	G5	S1		X		X					X	X	X	X			X	X	X	X		X	X		X	
Sessile Water-speedwell	Veronica catenata		E	G5	S1						X				X					X	X		X					X	
Veiny-leaf Arrow-wood	Viburnum dentatum var. venosum			G5T4T5	S2					X											X							X	
Witch-hobble	Viburnum lantanoides		E	G5	S1						X				X		X		X	X	X	X					X	X	X
Highbush-cranberry	Viburnum opulus var. americanum			G5T5	S3						X	X		X	X	X	X		X	X	X	X	X		X	X	X	X	X
American Purple Vetch	Vicia americana var. americana		E	G5T5	S1						X			X	X	X	X			X	X	X	X			X	X	X	

(Plant and natural community status and distribution continued)

		Status				Landscape Regions						Broad Habitat Category Associations																
Common Name	**Scientific Name**	**Federal Status**	**State Status**	**GRANK (per NatureServe)**	**SRANK (per NatureServe)**	**Atlantic Coastal Landscape**	**Delaware Bay Landscape**	**Marine Landscape**	**Piedmont Plains Landscape**	**Pinelands Landscape**	**Skylands Landscape**	**BARREN**	**BEACH-DUNE**	**GRASSLAND**	**NON-HABITAT**	**SHRUB UPLAND**	**SHRUB WETLAND**	**TIDAL WATER**	**UPLAND FOREST CON**	**UPLAND FOREST DEC**	**UPLAND FOREST MIX**	**URBANHAB**	**WATER**	**WETCOAST**	**WETDIST**	**WETEMERG**	**WETLAND FOREST CON**	**WETLAND FOREST DEC**	**WETLAND FOREST MIX**
RARE PLANTS *(continued)*																												
Carolina Wood Vetch	Vicia caroliniana		E	G5	S1						X			X	X	X				X			X				X	
Large-leaf White Violet	Viola blanda var. palustriformis			G4G5T4T5	S3						X								X	X							X	
Britton's Coast Violet	Viola brittoniana var. brittoniana			G4G5T4T5	S3	X	X		X					X	X	X	X		X	X	X	X	X		X	X	X	X	X
Cut-leaf Coast Violet	Viola brittoniana var. pectinata			G4G5T3?Q	SH		X							X	X	X				X	X		X					X	X
Canadian Violet	Viola canadensis var. canadensis		E	G5T5	S1						X										X		X					X	
Southern Wood Violet	Viola hirsutula			G4	S2						X			X	X	X			X	X	X	X						X	
Long-spur Violet	Viola rostrata			G5	S3				X		X					X				X	X							X	
Northern Blue Violet	Viola septentrionalis		E	G5	S1						X				X	X	X		X	X	X	X	X		X		X	X	X
Squirrel-tail Six-weeks Grass	Vulpia elliotea		E	G5	S1				X			X			X	X			X	X	X	X						X	
Slender Six-weeks Grass	Vulpia octoflora var. glauca			G5T5	SU																								
Barren-strawberry	Waldsteinia fragarioides var. fragarioides			G5T5	S2						X			X	X	X	X		X	X	X	X	X			X		X	
Sword Bogmat	Wolffiella gladiata		E	G5	S1				X					X	X	X		X		X		X	X	X	X	X		X	
Sand Yellow-eyed-grass	Xyris caroliniana		E	G4G5	S1					X						X	X		X							X	X		X
Chapman's Yellow-eyed-grass	Xyris chapmanii			G3	S1					X							X									X	X		X
Fringed Yellow-eyed-grass	Xyris fimbriata		E	G5	S1					X				X	X	X	X		X		X	X	X	X		X	X	X	X
Richard's Yellow-eyed-grass	Xyris jupicai			G5	S3		X									X							X	X				X	X
Northern Yellow-eyed-grass	Xyris montana		E	G4	S1.1						X						X						X				X		X
Death-camus	Zigadenus leimanthoides		E	G4Q	S1		X		X	X		X		X	X	X	X	X	X	X	X	X	X		X	X	X	X	X
NATURAL COMMUNITIES																													
Black Spruce Swamp	Black spruce swamp			G4	S1						X					X	X			X			X			X	X	X	X
Aster-like Boltonia - Small-headed Aster - Field Mint Herbaceous Vegetation	Boltonia asteroides var. asteroides - aster racemosus - mentha arvensis herbaceous vegetation			G1G2	S1S2						X								X	X			X				X		
Limestone Fen	Calcareous fen			G3?	S1						X			X	X	X	X		X	X	X	X	X		X	X		X	X
Calcareous Riverside Outcrop Community	Calcareous riverside outcrop community			G3?	S1S2						X									X	X		X						
Calcareous Riverside Seep Community	Calcareous riverside seep community			G3?	S1						X				X					X	X		X			X	X		
Cape May Lowland Swamp	Cape may lowland swamp			GNR	S1?		X								X	X	X		X	X	X	X	X			X	X	X	X
Northern Peatland Sedge Coastal Plain Pond	Carex striata var. brevis Herbaceous Vegetation			GNR	S1S3		X			X							X		X		X		X		X	X	X	X	X
Cave Aquatic Community	Cave aquatic community			G4?	S2						X	X		X	X	X	X		X	X	X	X	X		X	X		X	
Cave Terrestrial Community	Cave terrestrial community			G4?	S2						X	X		X	X	X	X		X	X	X	X	X		X	X		X	X
Atlantic White-cedar / Great Rhododendron Swamp	Chamaecyparis thyoides / Rhododendron maximum Forest			G2G3	S1						X								X	X	X						X		X

(Plant and natural community status and distribution continued)

		Status				Landscape Regions						Broad Habitat Category Associations																
Common Name	**Scientific Name**	**Federal Status**	**State Status**	**GRANK (per NatureServe)**	**SRANK (per NatureServe)**	**Atlantic Coastal Landscape**	**Delaware Bay Landscape**	**Marine Landscape**	**Piedmont Plains Landscape**	**Pinelands Landscape**	**Skylands Landscape**	**BARREN**	**BEACH-DUNE**	**GRASSLAND**	**NON-HABITAT**	**SHRUB UPLAND**	**SHRUB WETLAND**	**TIDAL WATER**	**UPLAND FOREST CON**	**UPLAND FOREST DEC**	**UPLAND FOREST MIX**	**URBANHAB**	**WATER**	**WETCOAST**	**WETDIST**	**WETEMERG**	**WETLAND FOREST CON**	**WETLAND FOREST DEC**	**WETLAND FOREST MIX**
NATURAL COMMUNITIES *(continued)*																												
Leatherleaf-sphagnum Boreal Dwarf-shrubland	Chamaedaphne calyculata-sphagnum boreal dwarf-shrubland			G4?	S1						X						X			X			X			X		X	
Twig-rush Coastal Plain Intermittent Pond Herbaceous Vegetation	Cladium mariscoides herbaceous vegetation			G3	S2					X																X	X		
Coastal Dune Shrubland	Coastal dune shrubland			G4	S2?	X		X					X		X		X	X						X					
Coastal Dune Woodland	Coastal dune woodland			G2G3	S1	X	X	X				X	X			X	X	X	X	X	X	X	X	X		X	X	X	
Vernal Pond	Coastal plain intermittent pond			G3?	S2S3		X			X				X	X	X	X		X	X	X	X	X		X	X	X	X	X
Dry-mesic Calcareous Forest	Dry-mesic calcareous forest			G3G4	S2?						X			X	X	X	X		X	X	X	X	X		X	X		X	X
Pine Plains (Pp4/5)	Dwarf pinus rigida-quercus (marilandica, ilicifolia)/corema conradii shrubland			G1	S1					X		X		X	X	X	X		X		X	X	X		X	X	X		X
Spikerush (Smallfruit, Bright Green, Robbin's) - Yelloweyed Grass (Bog, Small's) Coastal Plain Intermittent Pond Herbaceous Vegetation	Eleocharis (olivacea, microcarpa, robbinsii) - xyris (difformis var. difformis, smalliana) herbaceous vegetation			G2	S2		X			X						X	X		X		X	X	X		X	X	X	X	X
Floodplain Forest	Floodplain forest			G4	S3?				X		X			X	X	X	X			X		X	X		X	X		X	
Rich Red Maple - Black Ash Swamp	Fraxinus nigra - Acer rubrum - (Larix laricina) / Rhamnus alnifolia Forest			GNR	S1S3						X						X			X	X							X	
Freshwater Tidal Marsh Complex	Freshwater tidal marsh complex			G4?	S3?		X		X	X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Freshwater Tidal Swamp	Freshwater tidal swamp			G3?	S1S2				X					X	X	X	X	X		X	X	X		X		X		X	X
Inland Acidic Seep Community	Inland acidic seep community			G3?	S1						X				X				X	X	X		X				X		X
Prairie Fen	Juniperus virginiana / Betula pumila / Carex sterilis - Oligoneuron rigidum Shrub Herbaceous Vegetation			G1	S1						X					X	X		X	X							X	X	
Rice Cutgrass - (Oriental Ladysthumb, Marshpepper Knotweed) Coastal Plain Intermittent Pond Herbaceous Vegetation	Leersia oryzoides - polygonum (caespitosum, hydropiper) herbaceous vegetation			G4	S2S3		X		X								X		X	X	X	X	X					X	X
Rice Cut-grass - Green-fruited Bur-reed - Water Smartweed Seasonally Flooded Herbaceous Vegetation	Leersia oryzoides - sparganium chlorocarpum - polygonum amphibium herbaceous vegetation			G4	S3						X												X						
Marine Intertidal Gravel/sand Beach Community	Marine intertidal gravel/sand beach community			GU	SU	X		X				X	X					X						X					
Maritime Forest	Maritime forest			G3?	S1	X	X	X					X			X	X	X	X	X	X	X		X					X

(Plant and natural community status and distribution continued)

		Status				Landscape Regions						Broad Habitat Category Associations																
Common Name	**Scientific Name**	**Federal Status**	**State Status**	**GRANK (per NatureServe)**	**SRANK (per NatureServe)**	**Atlantic Coastal Landscape**	**Delaware Bay Landscape**	**Marine Landscape**	**Piedmont Plains Landscape**	**Pinelands Landscape**	**Skylands Landscape**	**BARREN**	**BEACH-DUNE**	**GRASSLAND**	**NON-HABITAT**	**SHRUB UPLAND**	**SHRUB WETLAND**	**TIDAL WATER**	**UPLAND FOREST CON**	**UPLAND FOREST DEC**	**UPLAND FOREST MIX**	**URBANHAB**	**WATER**	**WETCOAST**	**WETDIST**	**WETEMERG**	**WETLAND FOREST CON**	**WETLAND FOREST DEC**	**WETLAND FOREST MIX**
NATURAL COMMUNITIES *(continued)*																												
Pine Barrens Smokegrass Coastal Plain Intermittent Pond Herbaceous Vegetation	Muhlenbergia torreyana herbaceous vegetation			G2	S1					X							X		X				X			X	X		
Coastal Plain Pond	Nymphaea odorata - Eleocharis robbinsii Herbaceous Vegetation			G2	S1S2		X		X								X			X	X		X					X	X
Redtop Panicgrass - Rosette Grass / Sphagnum Moss Coastal Plain Intermittent Pond Herbaceous Vegetation	Panicum rigidulum var. pubescens - dichanthelium sp. / sphagnum spp. herbaceous vegetation			G2	S2		X			X						X	X		X	X	X		X		X	X	X	X	
Switchgrass Coastal Plain Intermittent Pond Herbaceous Vegetation	Panicum virgatum herbaceous vegetation			GNR	S1?		X																			X		X	
Black Spruce Woodland Bog	Picea mariana / (Vaccinium corymbosum, Gaylussacia baccata) / Sphagnum sp. Woodland			G3G5	S1						X				X		X			X			X			X	X	X	X
Pine Barren Savanna	Pine barren savanna			G2	S2					X							X		X				X			X	X	X	X
New Jersey Pitch Pine / Scrub Oak Barren	Pinus rigida / Quercus (marilandica, ilicifolia) / Pyxidanthera barbulata Woodland			G2	S2					X		X		X	X	X	X		X	X	X	X	X		X	X	X	X	X
Pitch Pine Lowlands (Undifferentiated)	Pinus rigida saturated woodland alliance			G3	S3					X		X		X	X	X	X		X	X	X	X	X		X	X	X	X	X
Pine-oak-shrub Oak Woodland (Pow)	Pinus rigida-(p. echinata)-quercus spp./quercus (marilandica, ilicifolia) woodland			G3	S3					X		X			X	X	X		X	X	X	X	X				X	X	X
Pitch Pine-pinelands Reedgrass Savanna	Pinus rigida-calamovilfa brevipilis savanna			G1	S1					X					X	X	X		X				X		X	X	X	X	X
Sycamore - Green Ash - American Elm / Red-osier Dogwood Forest	Platanus occidentalis - fraxinus pennsylvanica - ulmus americana / cornus sericea forest			G2G3	S1S2						X					X				X			X						
Marl Fen Plant Association	Potentilla fruticosa-myrica pensylvanica/deschampsia caespitosa sparse shrubland			G2	S1						X				X		X		X	X	X					X	X	X	
Primeval Forest	Primeval forest			G3?	S1		X		X							X	X			X			X			X		X	X
Yellow Water-crowfoot - Clearweed - Water Smartweed Herbaceous Vegetation	Ranunculus flabellaris - pilea pumila - polygonum amphibium herbaceous vegetation			G4	S3						X									X			X			X		X	

(Plant and natural community status and distribution continued)

(Plant and natural community status and distribution continued)

		Status				Landscape Regions						Broad Habitat Category Associations																	
Common Name	**Scientific Name**	**Federal Status**	**State Status**	**GRANK (per NatureServe)**	**SRANK (per NatureServe)**	**Atlantic Coastal Landscape**	**Delaware Bay Landscape**	**Marine Landscape**	**Piedmont Plains Landscape**	**Pinelands Landscape**	**Skylands Landscape**	**BARREN**	**BEACH-DUNE**	**GRASSLAND**	**NON-HABITAT**	**SHRUB UPLAND**	**SHRUB WETLAND**	**TIDAL WATER**	**UPLAND FOREST CON**	**UPLAND FOREST DEC**	**UPLAND FOREST MIX**	**URBANHAB**	**WATER**	**WETCOAST**	**WETDIST**	**WETEMERG**	**WETLAND FOREST CON**	**WETLAND FOREST DEC**	**WETLAND FOREST MIX**
NATURAL COMMUNITIES *(continued)*																													
Coastal Plain Muck Pondshore	Rhexia virginica - Panicum verrucosum Herbaceous Vegetation			G2G3	S1S3		X		X	X						X	X		X	X	X		X			X	X	X	X
Shale Cliff/rock Outcrop Community	Shale cliff/rock outcrop community			G3	S2?						X			X	X	X				X	X		X					X	
Talus Slope Community	Talus slope community			G4?	S2S3						X	X		X	X	X			X	X	X	X	X					X	X
Traprock Glade/rock Outcrop Community	Traprock glade/rock outcrop community			G2	S1				X		X					X				X	X		X					X	
Hemlock - Hardwood Swamp	Tsuga canadensis - Betula alleghaniensis / Ilex verticillata / Sphagnum spp. Forest			G5	S2						X						X		X	X	X		X				X	X	X

SOURCES:

New Jersey Natural Heritage Program. 2017. Biotics 5 database. NatureServe, Arlington, Virginia. (NJ Data Accessed: June 16, 2017)

New Jersey Department of Environmental Protection. 2016. List of Endangered Plant Species and Plant Species of Concern. Office of Natural Lands Management, Natural Heritage Program, Trenton, NJ. 16 pages.
http://www.state.nj.us/dep/parksandforests/natural/heritage/njplantlist.pdf

EXPLANATIONS OF CODES USED IN NATURAL HERITAGE REPORTS

FEDERAL STATUS CODES

The following U.S. Fish and Wildlife Service categories and their definitions of endangered and threatened plants and animals have been modified from the U.S. Fish and Wildlife Service (F.R. Vol. 50 No. 188; Vol. 61, No. 40; F.R. 50 CFR Part 17). Federal Status codes reported for species follow the most recent listing.

LE Taxa formally listed as endangered.

LT Taxa formally listed as threatened.

PE Taxa already proposed to be formally listed as endangered.

PT Taxa already proposed to be formally listed as threatened.

C Candidate taxa for which the Service currently has on file sufficient information on biological vulnerability and threat(s) to support proposals to list them as endangered or threatened species.

S/A Similarity of appearance species.

STATE STATUS CODES

Two animal lists provide state status codes after the Endangered and Nongame Species Conservation Act of 1973 (NSSA 23:2A-13 et. seq.): the list of endangered species (N.J.A.C. 7:25-4.13) and the list defining status of indigenous, nongame wildlife species of New Jersey (N.J.A.C. 7:25-4.17(a)). The status of animal species is determined by the Nongame and Endangered Species Program (ENSP). The state status codes and definitions provided reflect the most recent lists that were revised in the New Jersey Register, Monday, June 3, 1991.

D Declining species-a species which has exhibited a continued decline in population numbers over the years.

E Endangered species-an endangered species is one whose prospects for survival within the state are in immediate danger due to one or many factors - a loss of habitat, over exploitation, predation, competition, disease. An endangered species requires immediate assistance or extinction will probably follow.

EX Extirpated species-a species that formerly occurred in New Jersey, but is not now known to exist within the state.

I Introduced species-a species not native to New Jersey that could not have established itself here without the assistance of man.

INC Increasing species-a species whose population has exhibited a significant increase, beyond the normal range of its life cycle, over a long term period.

T Threatened species-a species that may become endangered if conditions surrounding the species begin to or continue to deteriorate.

P Peripheral species-a species whose occurrence in New Jersey is at the extreme edge of its present natural range.

S Stable species-a species whose population is not undergoing any long-term increase/decrease within its natural cycle.

U Undetermined species-a species about which there is not enough information available to determine the status.

Status for animals separated by a slash(/) indicate a duel status. First status refers to the state breeding population, and the second status refers to the migratory or winter population.

SC Special Concern - applies to animal species that warrant special attention because of some evidence of decline, inherent vulnerability to environmental deterioration, or habitat modification that would result in their becoming a Threatened species. This category would also be applied to species that meet the foregoing criteria and for which there is little understanding of their current population status in the state.

Plant taxa listed as endangered are from New Jersey's official Endangered Plant Species List N.J.S.A. 131B-15.151 et seq.

E Native New Jersey plant species whose survival in the State or nation is in jeopardy.

REGIONAL STATUS CODES FOR PLANTS AND ECOLOGICAL COMMUNITIES

LP Indicates taxa listed by the Pinelands Commission as endangered or threatened within their legal jurisdiction. Not all species currently tracked by the Pinelands Commission are tracked by the Natural Heritage Program. A complete list of endangered and threatened Pineland species is included in the New Jersey Pinelands Comprehensive Management Plan.

HL Indicates taxa or ecological communities protected by the Highlands Water Protection and Planning Act within the jurisdiction of the Highlands Preservation Area.

EXPLANATION OF GLOBAL AND STATE ELEMENT RANKS

The Nature Conservancy developed a ranking system for use in identifying elements (rare species and ecological communities) of natural diversity most endangered with extinction. Each element is ranked according to its global, national, and state (or subnational in other countries) rarity. These ranks are used to prioritize conservation work so that the most endangered elements receive attention first. Definitions for element ranks are after The Nature Conservancy (1982: Chapter 4, 4.1-1 through 4.4.1.3-3).

GLOBAL ELEMENT RANKS

G1 Critically imperiled globally because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extinction.

G2 Imperiled globally because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extinction throughout its range.

G3 Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range (e.g., a single western state, a physiographic region in the East) or because of other factors making it vulnerable to extinction throughout its range; with the number of occurrences in the range of 21 to 100.

G4 Apparently secure globally; although it may be quite rare in parts of its range, especially at the periphery.

G5 Demonstrably secure globally; although it may be quite rare in parts of its range, especially at the periphery.

GH Of historical occurrence throughout its range i.e., formerly part of the established biota, with the expectation that it may be rediscovered.

GU Possibly in peril range-wide but status uncertain; more information needed.

GX Believed to be extinct throughout range (e.g., passenger pigeon) with virtually no likelihood that it will be rediscovered.

G? Species has not yet been ranked.

GNR Species has not yet been ranked.

STATE ELEMENT RANKS

S1 Critically imperiled in New Jersey because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres). Elements so ranked are often restricted to very specialized conditions or habitats and/or restricted to an extremely small geographical area of the state. Also included are elements which were formerly more abundant, but because of habitat destruction or some other critical factor of its biology, they have been demonstrably reduced in abundance. In essence, these are elements for which, even with intensive searching, sizable additional occurrences are unlikely to be discovered.

S2 Imperiled in New Jersey because of rarity (6 to 20 occurrences). Historically many of these elements may have been more frequent but are now known from very few extant occurrences, primarily because of habitat destruction. Diligent searching may yield additional occurrences.

S3 Rare in state with 21 to 100 occurrences (plant species and ecological communities in this category have only 21 to 50 occurrences). Includes elements which are widely distributed in the state but with small populations/acreage or elements with restricted distribution, but locally abundant. Not yet imperiled in state but may soon be if current trends continue. Searching often yields additional occurrences.

S4 Apparently secure in state, with many occurrences.

S5 Demonstrably secure in state and essentially ineradicable under present conditions.

SA Accidental in state, including species (usually birds or butterflies) recorded once or twice or only at very great intervals, hundreds or even thousands of miles outside their usual range; a few of these species may even have bred on the one or two occasions they were recorded; examples include European strays or western birds on the East Coast and vice-versa.

SE Elements that are clearly exotic in New Jersey including those taxa not native to North America (introduced taxa) or taxa deliberately or accidentally introduced into the State from other parts of North America (adventive taxa). Taxa ranked SE are not a conservation priority (viable introduced occurrences of G1 or G2 elements may be exceptions).

SH Elements of historical occurrence in New Jersey. Despite some searching of historical occurrences and/or potential habitat, no extant occurrences are known. Since not all of the historical occurrences have been field surveyed, and unsearched potential habitat remains, historically ranked taxa are considered possibly extant, and remain a conservation priority for continued field work with the expectation they may be rediscovered.

SP Element has potential to occur in New Jersey, but no occurrences have been reported.

SR Elements reported from New Jersey, but without persuasive documentation which would provide a basis for either accepting or rejecting the report. In some instances documentation may exist, but as of yet, its source or location has not been determined.

SRF Elements erroneously reported from New Jersey, but this error persists in the literature.

SU Elements believed to be in peril but the degree of rarity uncertain. Also included are rare taxa of uncertain taxonomical standing. More information is needed to resolve rank.

SX Elements that have been determined or are presumed to be extirpated from New Jersey. All historical occurrences have been searched and a reasonable search of potential habitat has been completed. Extirpated taxa are not a current conservation priority.

SXC Elements presumed extirpated from New Jersey, but native populations collected from the wild exist in cultivation.

SZ Not of practical conservation concern in New Jersey, because there are no definable occurrences, although the taxon is native and appears regularly in the state. An SZ rank will generally be used for long distance migrants whose occurrences during their migrations are too irregular (in terms of repeated visitation to the same locations), transitory, and dispersed to be reliably identified, mapped and protected. In other words, the migrant regularly passes through the state, but enduring, mappable element occurrences cannot be defined.

Typically, the SZ rank applies to a non-breeding population (N) in the state - for example, birds on migration. An SZ rank may in a few instances also apply to a breeding population (B), for example certain lepidoptera which regularly die out every year with no significant return migration.

Although the SZ rank typically applies to migrants, it should not be used indiscriminately. Just because a species is on migration does not mean it receives an SZ rank. SZ will only apply when the migrants occur in an irregular, transitory and dispersed manner.

B Refers to the breeding population of the element in the state.

N Refers to the non-breeding population of the element in the state.

T Element ranks containing a "T" indicate that the infraspecific taxon is being ranked differently than the full species. For example *Stachys palustris* var. *homotricha* is ranked "G5T? SH" meaning the full species is globally secure but the global rarity of the var. *homotricha* has not been determined; in New Jersey the variety is ranked historic.

Q Elements containing a "Q" in the global portion of its rank indicates that the taxon is of questionable, or uncertain taxonomical standing, e.g., some authors regard it as a full species, while others treat it at the subspecific level.

.1 Elements only, ever documented from a single location.

Note: To express uncertainty, the most likely rank is assigned and a question mark added (e.g., G2?). A range is indicated by combining two ranks (e.g., G1G2, S1S3).

IDENTIFICATION CODES

These codes refer to whether the identification of the species or community has been checked by a reliable individual and is indicative of significant habitat.

These codes are not included on all Natural Heritage Reports.

Y Identification has been verified and is indicative of significant habitat.

BLANK Identification has not been verified but there is no reason to believe it is not indicative of significant habitat.

? Either it has not been determined if the record is indicative of significant habitat or the identification of the species or community may be confusing or disputed.

Revised March 2010

Downloaded on July 18, 2017 from:
New Jersey Department of Environmental Protection. 2010. Explanations of Codes Used in Natural Heritage Reports. Office of Natural Lands Management, Natural Heritage Program, Trenton, NJ. 4 pages. http://www.state.nj.us/dep/parksandforests/natural/heritage/nhpcodes_2010.pdf